DOCUMENT RESUME

ED 169 293 CE 020 478

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TITLE T & I--Basic Electricity. Kit No. 4. Instructor's Manual [and] Student Learning Activity Guide.
INSTITUTION Clemson Univ., S.C. Vocational Education Media Center.; South Carolina State Dept. of Education, Columbia. Office of Vocational Education.
SPONS AGENCY Office of Education (DHEW), Washington, D.C.
PUB DATE 78
GRANT SC-5058-76-I-211-0330
NOTE 53p.; For related documents see CE 020 474-566
AVAILABLE FROM Vocational Education Media Center, 10 Tillman Hall, Clemson University, Clemson, South Carolina 29631 (complete set of modules, 14 filmstrips and cassettes, $260.00; set of 87 student modules, $42.50)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS Behavioral Objectives; *Electrical Occupations; *Electricity; *Learning Activities; *Learning Modules; Occupational Clusters; *Occupational Information; Prevocational Education; *Trade and Industrial Education; Transparencies

ABSTRACT

An instructor's manual and student activity guide on basic electricity are provided in this set of prevocational education materials which focuses on the vocational area of trade and industry. (This set of materials is one of ninety-two prevocational education sets arranged around a cluster of seven vocational offerings: agriculture, home economics, distributive education, health occupations, world of work, trade and industry, and office occupations.) The instructor's guide is organized into the following elements: title of activity, duration of activity (six to ten classes), activity goals, instructional objectives (seven), related vocational clusters, and activity implementation (description, materials needed, safety considerations, teacher preparation prior to class, during the class, follow-up activities, answer key to student check point activities and masters for duplication [i.e., job supervisor's material list, wiring plans]). The student activity guide, organized for different groups (salespersons, delivery persons, inspectors, job supervisors, and workers), provides step-by-step instructions (narrative and illustrations) for completing each instructional objective. Objectives include identifying electrical symbols and items, stripping and joining wire, and taking material orders. At the end of each set of instructions is a student check point (evaluation activity). An occupational description for an electrician concludes the document. (JH)

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ED169293

T & I – BASIC ELECTRICITY

Kit No. 4

INSTRUCTOR'S MANUAL

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1978

CE 020 478

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TITLE OF ACTIVITY

Kit No. 4, T & I – Basic Electricity

DURATION

Main Activity – 5 to 8 class periods
Follow-up – 1 to 2 class periods

GOALS

The student will learn some of the things an electrician does.

The student will learn electrical symbols used in wiring.

The student will learn the use and care of tools.

The student will learn how to handle tools safely.

INSTRUCTIONAL OBJECTIVES

The student will be able to identify 18 electrical symbols.

The student will identify 15 electrical items.

The student will use a hammer and nail set to start a screw hole.

The student will use an electrical drill to drill holes.

The student will strip wire.

The student will join wires together.

The student (salesperson) will take materials order from job supervisor.

VOCATIONAL CLUSTERS

Trade and Industry, Health, Office

ACTIVITY IMPLEMENTATION

A. Description

The student will learn to recognize electrical symbols used in electrical wiring and to read blueprints. Making orders and purchasing materials will be another part of the activity. The student will wire an electrical circuit similar to those found in a house. This activity will provide hands on work for the student.

B. Safety

Handle tools carefully to avoid injury to yourself and others.

C. Materials Required

1. Audio Visual Equipment:
   None

2. Technical Equipment
   2 fuse boxes with switch
   2 junction boxes, 4" (10.16 cm)
   10 utility boxes
   4 octagon boxes, 4" (10.16 cm)
   2 transformers, 10 volt
   2 pushbutton switches
   2 bells, 10 volt
   2 toggle switches
   4 toggle switches, 3-way
   4 duplex receptacles
   4 receptacle porcelain ceiling sockets, without switch
   50 wood screws, flathead, No. 8, 3/4" (1.905 cm)
   8 fuses, 15 amp.
   4 duplex receptacle plates (metal)
   6 toggle switch plates (metal)
   40 cable connectors
   4 nail sets
   4 hammers, claw, 10 oz. (283.5 g)
   2 speed bore bits, ½" (1.27 cm)
   2 electric drills, 3/8" (.9525 cm)
   2 heavy duty dropcords, 12' (3.6576 m)
   12 screwdrivers, 6" (15.24 cm)
   6 electrician pliers, 6" (15.24 cm)
   6 electrical strippers
   2 pairs safety goggles
   1 continuity checker

3. Expendable Materials:
   2 rolls plastic electrical tape
   40' (12.192 m) Romex cable, 2–conductor
   4' (1.2192 m) Romex cable, 3–conductor
   2' (.6096 m) bell wire
   2 pieces 3/4" (1.905 cm) plywood, 18" x 24" (45.72 x 60.96 cm)

D. Preparation Prior to Class

Run off handout sheets.
Go over flow chart.
Read through activity.
Cut romex cable into 2 ft. (.6096 m) pieces.
Cut bell wire into 8" (20.32 cm) pieces.

E. Procedure During Class Session

Check class on electrical symbols and equivalents.

Go over flow chart with the class, making group assignments.

Before starting work with Groups C and D, issue each student a diagram of how wall section or board is to be wired. Be sure students refer to these diagrams when mounting or wiring any part of this circuit.

Start class working. Give out tools and equipment as needed.

Go from group to group to answer questions and check work.

F. Follow-Up Activity

1. Have students fill out VIEW fact sheet.
2. Tour vocational school.
3. Visit construction site.
4. Have class do an interview (an electrician).

ANSWER KEY

Checkpoint, Instructional Objective I

1. Octagon box
2. Porcelain ceiling socket with pull chain switch
3. Fuse box with switch
4. Porcelain ceiling socket without switch
5. Utility box
6. Duplex receptacle
7. Buzzer
8. Push button switch
9. Quick connecting plug
10. Bell
11. Transformer
12. Romex cable — 2-conductor
13. Wires join
14. Tee Tap next to hook
15. Toggle switch
16. Romex cable — 3-conductor
17. 3-way toggle switch
18. Wires cross but do not join

Checkpoint, Instructional Objective II

1. Octagon boxes
2. Receptacle porcelain ceiling socket without switch
3. Duplex receptacle plate
4. Fuse box with switch
5. 10 volt transformer
6. Cable connector
7. Fuses
8. Toggle switch
9. 3-way toggle switch
10. Duplex receptacle
11. Junction box
12. Bell
13. Utility boxes
14. Toggle switch plate
15. Push-button switch

MASTERS FOR DUPLICATION

1. VIEW Fact Sheet
2. Job Supervisor's Material List
3. Price List for Salesperson
4. Order Form for Salesperson
5. Tools Needed by Job Supervisor
6. Plan for Group C Using Wall Section
7. Plan for Group D Using Wall Section
8. Plan for Group C and D Using Board
9. Check sheet for Group C and D Using Board
10. Check sheet for Group C and D Using Wall Section

VIEW FACT SHEET

NAME _____ CLASS _____ OCCUPATION _____

A. List the advantages (good points) of this occupation (job).

B. List the disadvantages (bad points) of this occupation (job).

C. List three things you should know to do this occupation (job).
1.
2.
3.

D. What type of education should you get to be prepared (do) for this occupation (job)?

E. What courses must you take to go into this occupation (job)?

F. What do you think your future in this occupation (job) will be?

G. What wage can you expect in this occupation (job)?

H. What are the working hours of this occupation (job)?

I. To learn more about this occupation (job), write to:

J. Using a scale of 1 to 5, circle the number that measures your interest in this occupation (job) as a possible career.

I don't like it. 1 2 3 4 5 I like it.

JOB SUPERVISOR'S MATERIAL LIST

QUANTITY	DESCRIPTION
1	fuse box with switch
1	junction box 4"(10.16 cm)
5	utility boxes
2	octagon boxes 4"(10.16 cm)
1	10 volt transformer
1	push button switch
1	bell
1	toggle switch
2	3 way toggle switches
2	duplex receptacles
2	receptacle porcelain ceiling sockets, without switch
22	wood screws
4	fuses
2	duplex receptacle plates
3	toggle switch plates
16	cable connectors

PRICE LIST FOR SALESPERSON

DESCRIPTION	UNIT COST
Fuse box with switch	$10.00
Junction box 4"	.75
Utility box	1.00
Octagon box	1.00
10 volt transformer	4.85
Push button switch	.35
Bell	3.65
Toggle switch	1.25
3 way toggle switch	1.50
Duplex receptacle	1.19
Receptacle porcelain ceiling socket, without switch	.65
Wood screws	.05
Fuse	.15
Duplex receptacle plate	.55
Toggle switch plate	.55
Cable connector	.25

ORDER FORM FOR SALESPERSON

QUANTITY	DESCRIPTION	UNIT COST	TOTAL COST
		SUBTOTAL	
		TAX	
		TOTAL	

TOOLS THAT JOB SUPERVISOR NEEDS TO GET FROM THE INSTRUCTOR

1 heavy duty dropcord, 12' (3.6576 m)

1 pair safety goggles

6 screwdrivers

3 pliers

3 wire strippers

1 bit, ½"(1.27 cm)

1 drill, 3/8" (.9525 cm)

2 nail sets

2 hammers

1 continuity checker

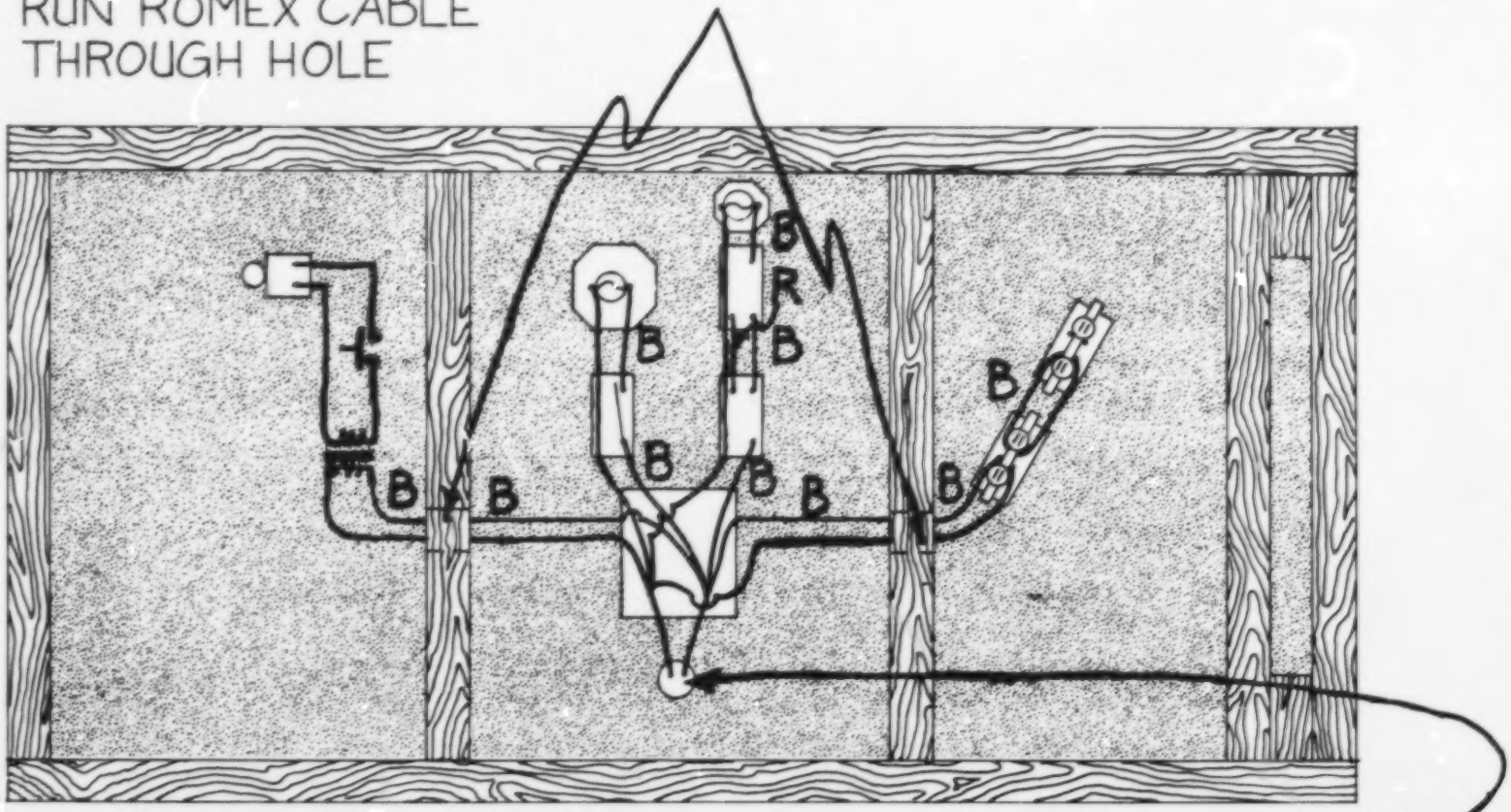
1 roll of plastic electrical tape

8 pieces romex cable, 2—conductor

1 piece romex cable, 3—conductor

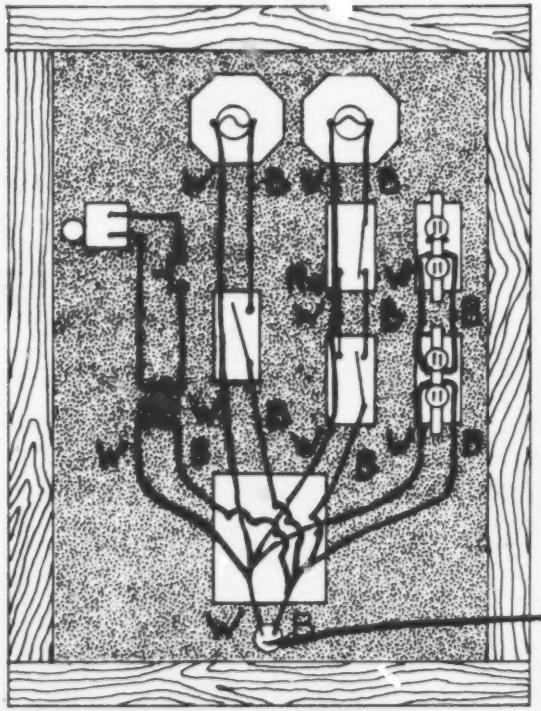
3 pieces bell wire

DRILL HOLE THROUGH 2X4,
RUN ROMEX CABLE
THROUGH HOLE



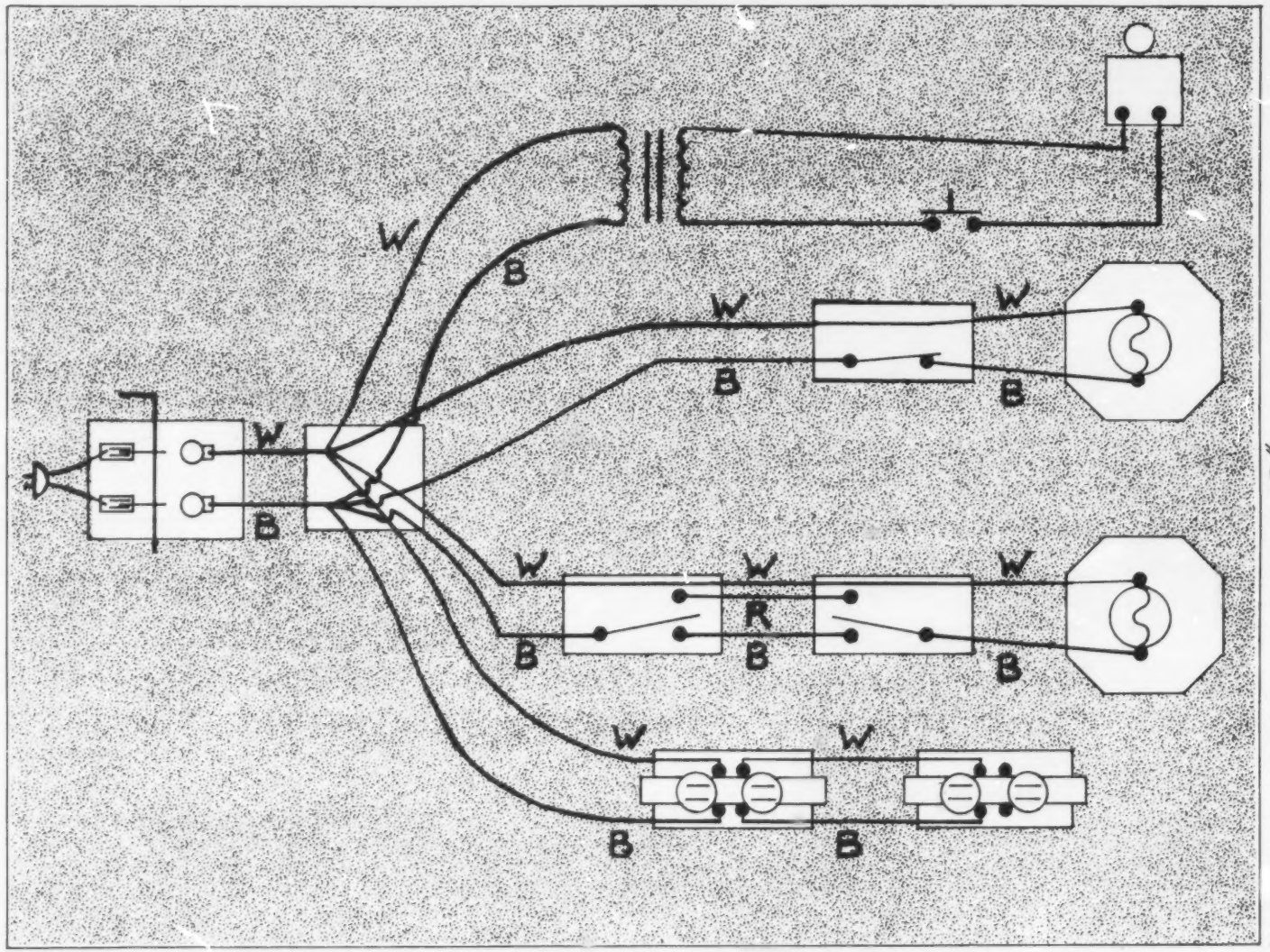
DRILL HOLE THROUGH PLYWOOD. MOUNT FUSE BOX ON OUTSIDE OF WALL AND RUN ROMEX CABLE THROUGH HOLE.

PLAN FOR GROUP C USING WALL SECTION



DRILL HOLE THROUGH PLYWOOD. MOUNT FUSE BOX ON OUTSIDE OF WALL. PUT ROMEX CABLE THROUGH HOLE IN WALL.

PLAN FOR GROUP D USING WALL SECTION



PLAN FOR GROUP C AND D USING BOARD

CHECK SHEET
FOR GROUP C AND D USING BOARD

Requirement	Completed
Instructional Objective I	
1. Items mounted on board	
2. Started holes for wood screws	
3. Secured boxes with screws	
Instructional Objective II	
1. Cable connectors put on boxes	
2. Correct wires put in boxes	
Instructional Objective III	
1. Outside insulation stripped	
2. Inside insulation stripped	
Instructional Objective IV	
1. Fuse box wired	
2. Junction box wired	
3. Duplex receptacles wired	
4. Toggle switch wired	
5. 3-way toggle switches wired	
6. Receptacle porcelain ceiling socket wired	
7. Wires hooked correctly and taped	
Instructional Objective V	
1. Electrical hardware put into boxes	
2. Covers put on toggle switches and duplex receptacles	
Instructional Objective VI	
1. Romex cable wired to transformer	
2. Bell wire hooked to transformer	

Check sheet for Group C and D Using Board, Continued

Requirement	Completed
Instructional Objective VI, Continued	
3. Bell wire hooked to bell	
4. Bell wire hooked to pushbutton switch	
5. All wires taped	
Instructional Objective VII	
1. Fuse box plugged into dropcord	
2. Fuses screwed in tight and fuse box turned on	
3. Bell rings	
4. Light burns when toggle switch is turned on	
5. Light burns when 3-way toggle switches are turned on	
6. Duplex receptacles work	

CHECK SHEET
FOR GROUP C AND D USING WALL SECTION

Requirement	Completed
Instructional Objective I	
1. Bit inserted and tightened into drill	
2. Holes drilled in plywood	
3. Holes drilled in 2 x 4	
Instructional Objective II	
1. Boxes and items mounted on board	
2. Started holes for wood screws	
3. Tightened two screws in each box	
4. Mounted fuse box with switch	
Instructional Objective III	
1. Cable connectors put on boxes	
2. Correct wires put in boxes	
Instructional Objective IV	
1. Outside insulation stripped	
2. Inside insulation stripped	
Instructional Objective V	
1. Fuse box wired	
2. Junction box wired	
3. Duplex receptacles wired	
4. Toggle switch wired	
5. 3-way toggle switches wired	
6. Receptacle porcelain ceiling socket wired	
7. Wires hooked correctly and taped	

Check sheet for Group C and D Using Wall Section, Continued

Requirement	Completed
Instructional Objective VI	
1. Electrical hardware put into boxes	
2. Covers put on toggle switches and duplex receptacles	
Instructional Objective VII	
1. Romex cable wired to transformer	
2. Bell wire hooked to transformer	
3. Bell wire hcoked to bell	
4. Bell wire hooked to pushbutton switch	
5. All wires taped	
Instructional Objective VIII	
1. Fuse box plugged into dropcord	
2. Fuses screwed in tight and fuse box turned on	
3. Bell rings	
4. Light burns when toggle switch is turned on	
5. Light burns when 3-way toggle switches are turned on	
6. Duplex receptacles work	

T & I – BASIC ELECTRICITY

Kit No. 4

STUDENT

LEARNING ACTIVITY GUIDE

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BASIC ELECTRICITY
House Wiring

INTRODUCTION

During this activity you will be learning about Basic Electricity. You will be working in groups using hand tools to complete the project. During the next several class periods, you will wire up circuits like the ones that are found in your home.

FLOW CHART

Flow Chart and Number in Each Group

Groups A & B:

Salesperson—1 student
Deliveryperson—1 student } 1 student
Inspector—1 student

The salesperson also becomes an inspector.

Groups C & D:

Job supervisor—1 student
Worker(s)—2 to 8 students

Group A → Group C

Group B → Group D

Group A and B inspect and mark check sheet for Group C and D as they complete the steps.

DIRECTIONS

Read through the steps carefully before starting.

Follow each step carefully.

Study flowchart so that you will know where you are supposed to go.

Handle the tools carefully to avoid injury to yourself or others while working in the groups.

Be sure to have the group inspector check the check sheet when he/she is to mark it.

The inspector will need to obtain the check sheet for his/her group.

The salesperson will need to obtain the order forms.

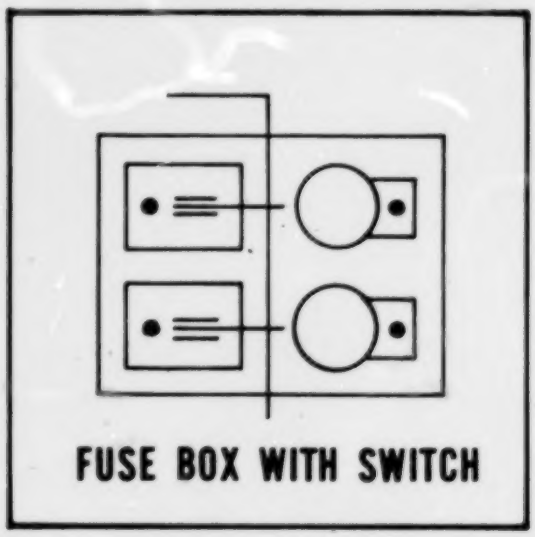
The job supervisor will need to obtain his materials list.

PROGRAMMED TEXT FOR ALL STUDENTS

Instructional Objective 1

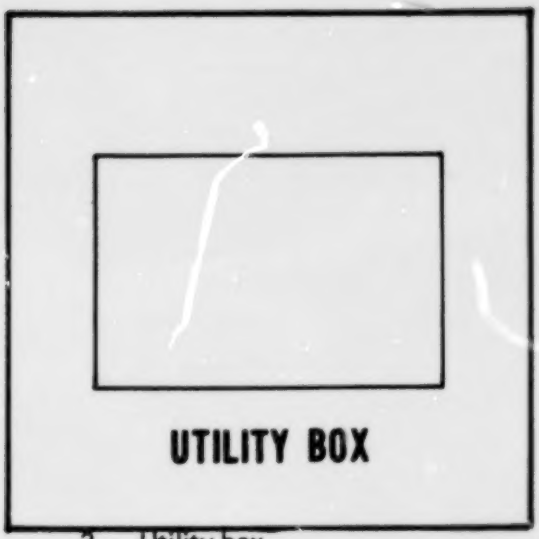
The student will identify 18 electrical symbols.

STEP 1 – Observe and study the following symbols and terms:



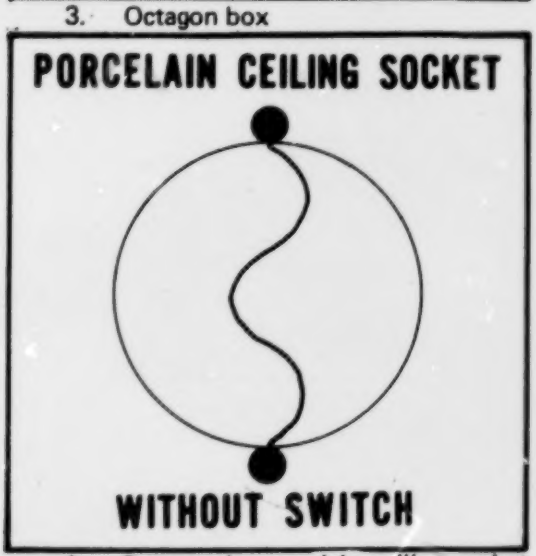
FUSE BOX WITH SWITCH

1. Fuse box with switch

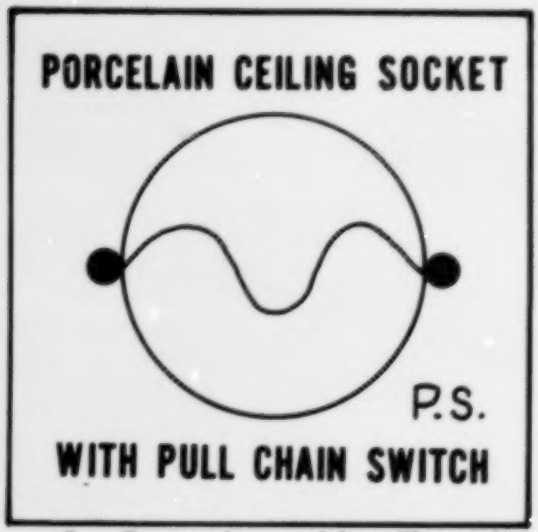


2. Utility box

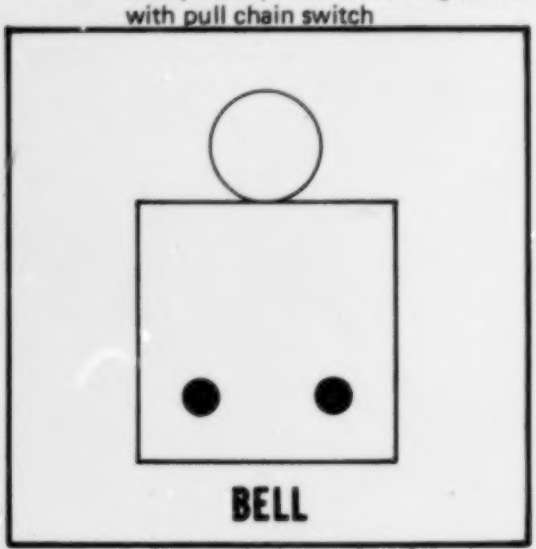
3. Octagon box



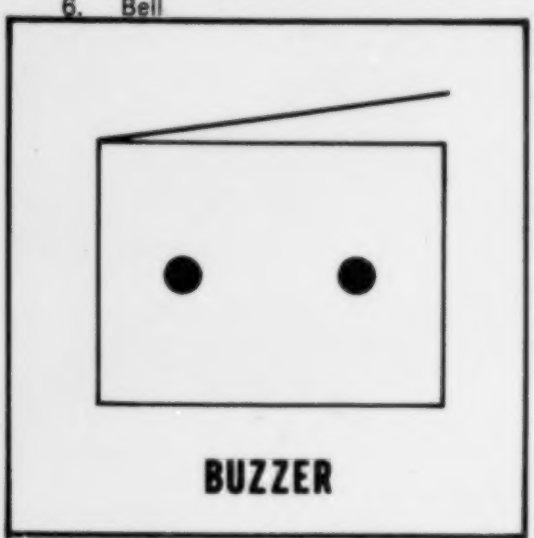
4. Receptacle porcelain ceiling socket without switch



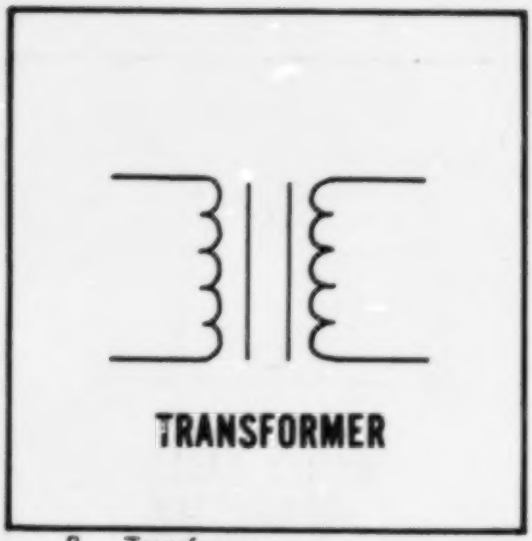
5. Receptacle porcelain ceiling socket with pull chain switch



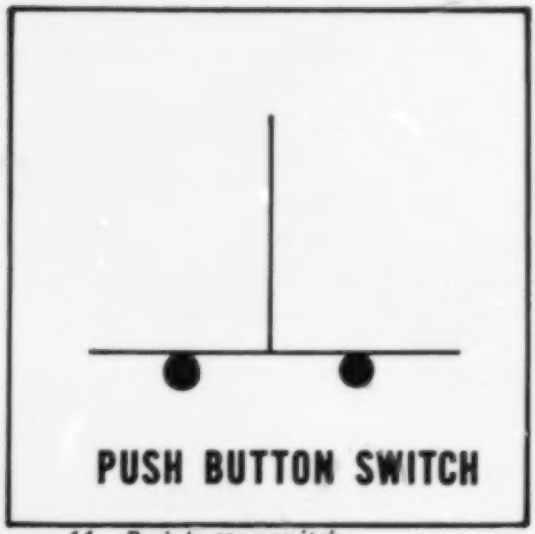
6. Bell



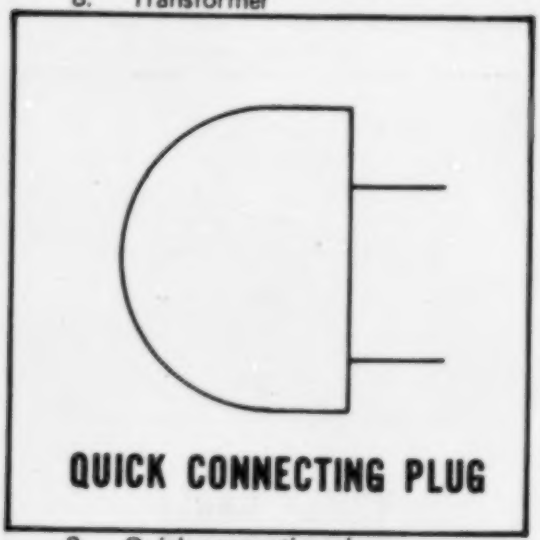
7. Buzzer



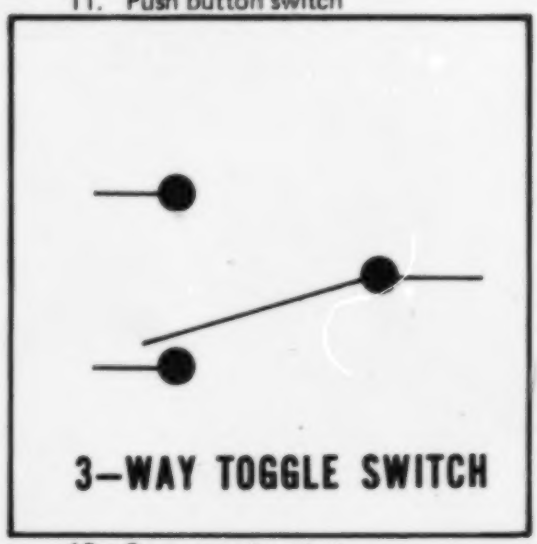
8. Transformer



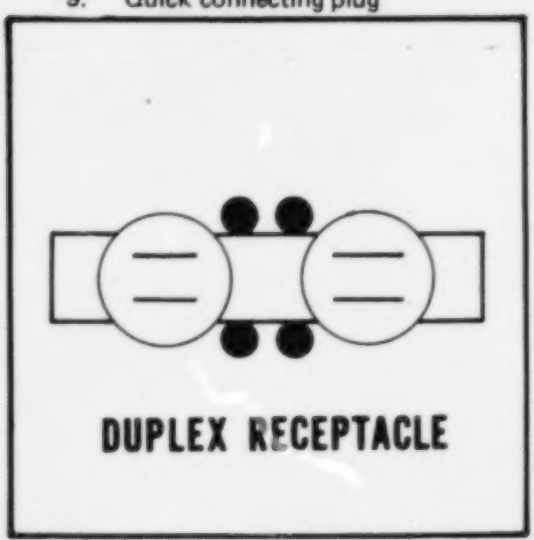
11. Push button switch



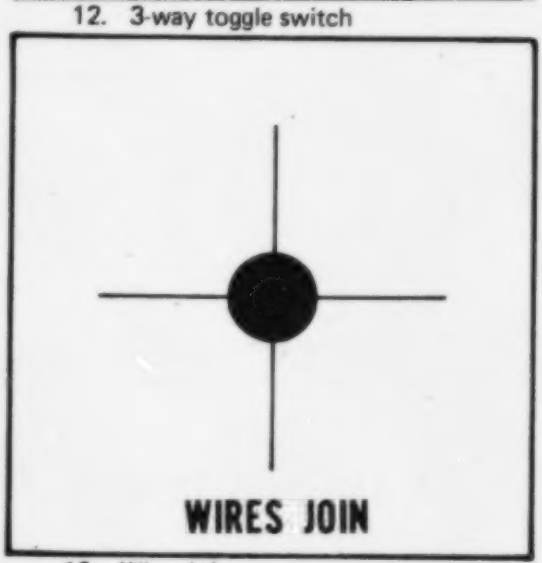
9. Quick connecting plug



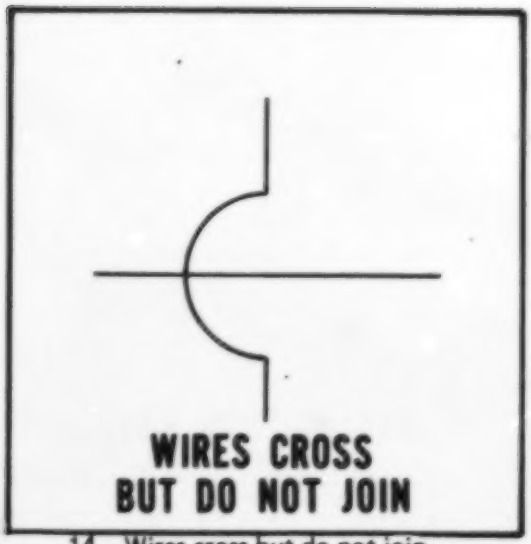
12. 3-way toggle switch



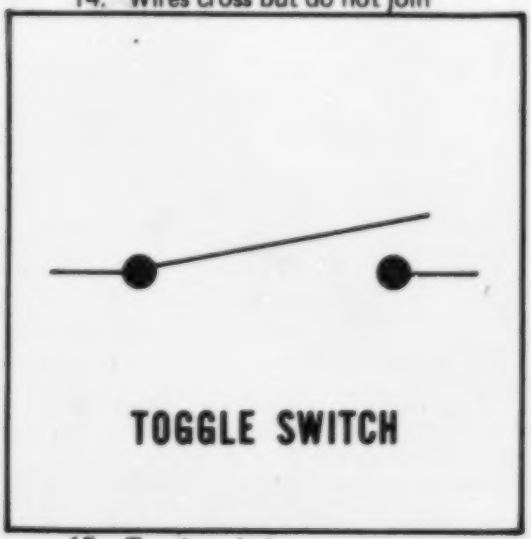
10. Duplex receptacle



13. Wires join

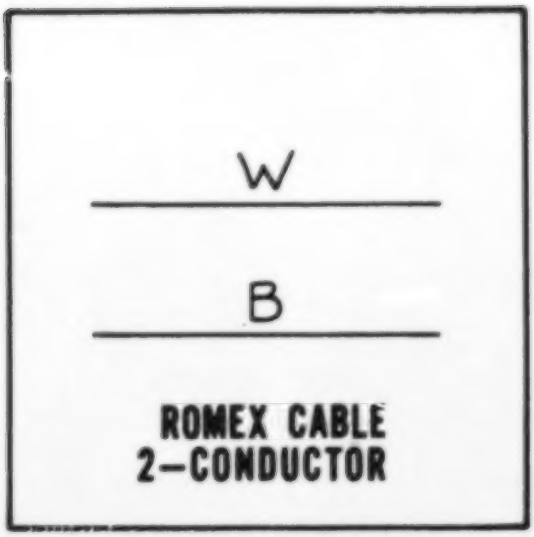


14. Wires cross but do not join

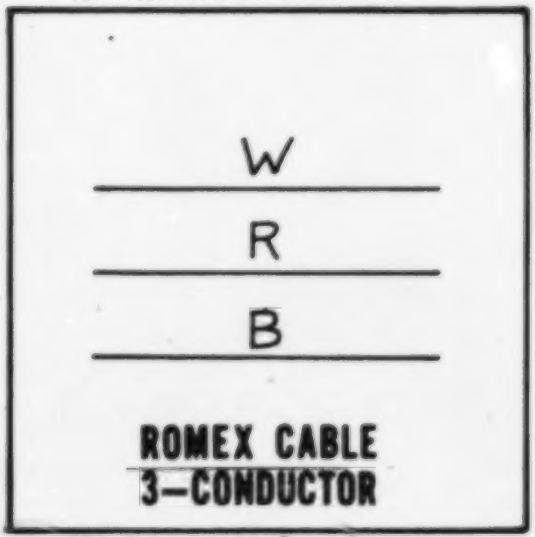


15. Toggle switch

16. Tee tap next to hook



17. Romex cable 2-conductor

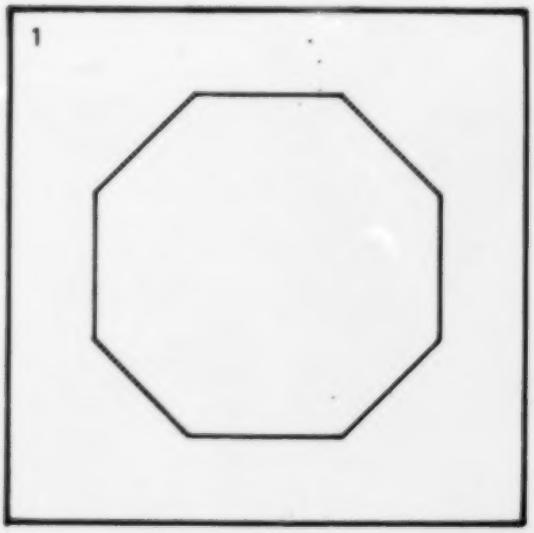


18. Romex cable 3-conductor

Check Point

On a separate sheet of paper, label 1 - 18 and identify the following symbols.

1



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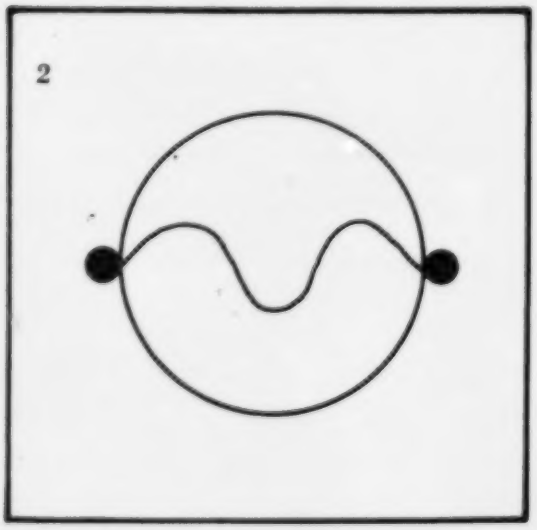

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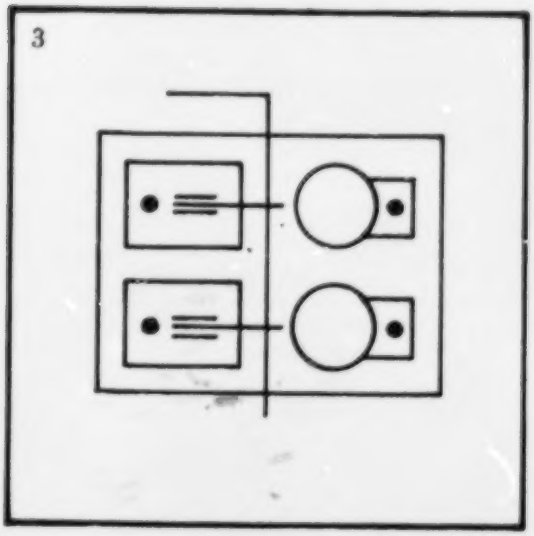

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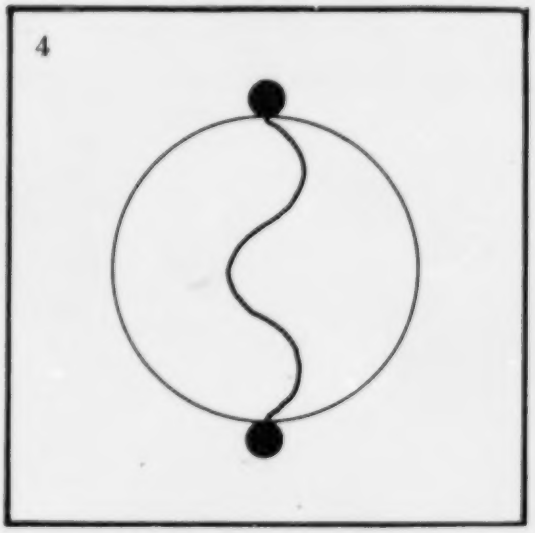

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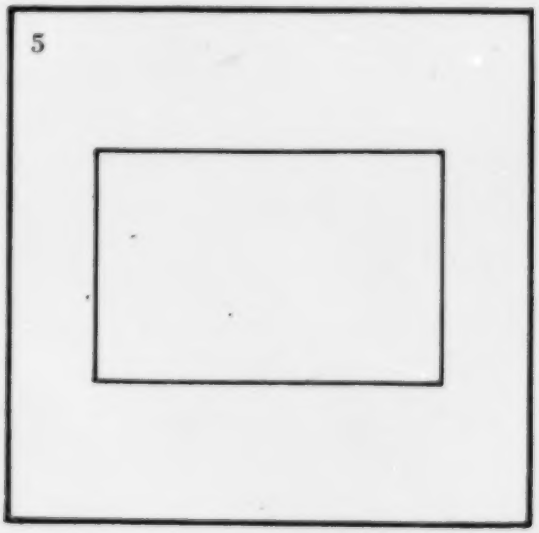

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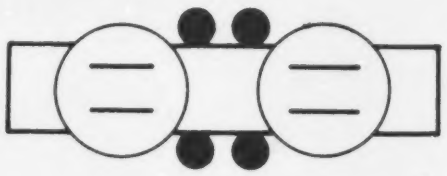

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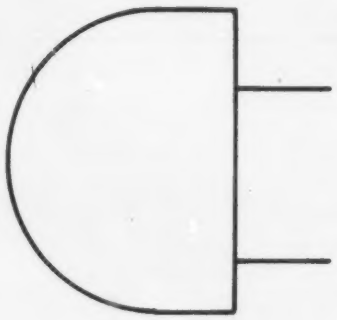

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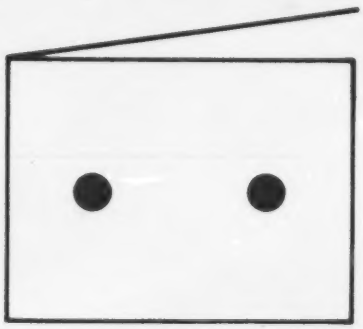

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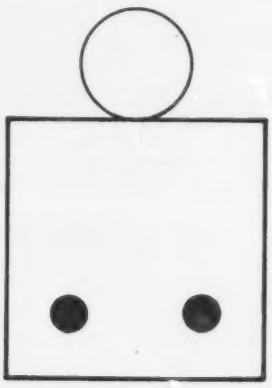

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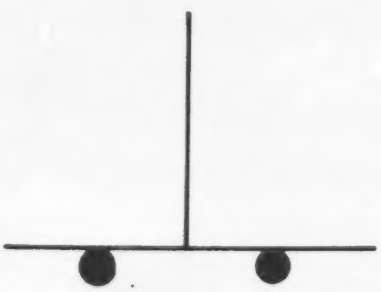

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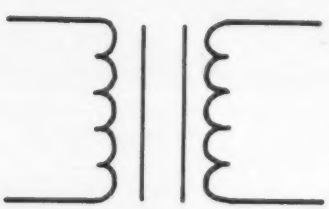

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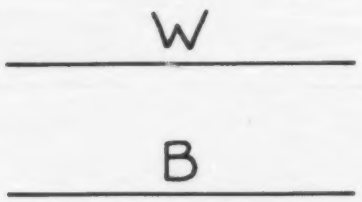

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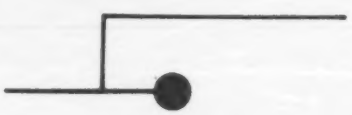

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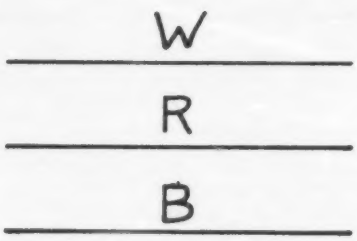

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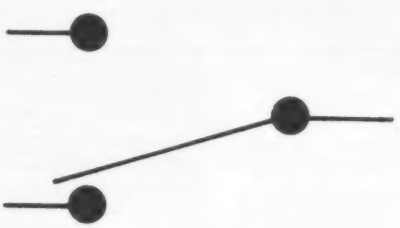
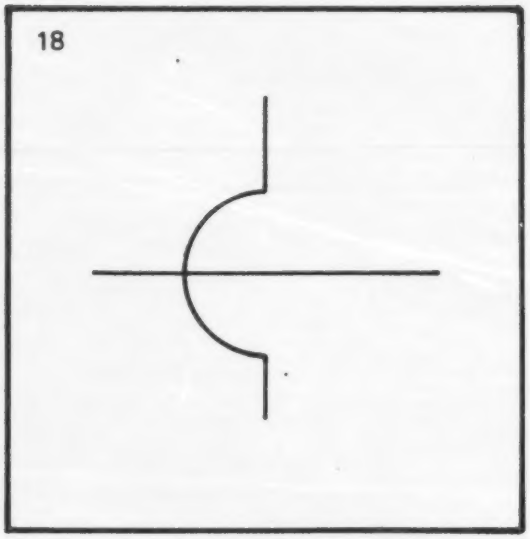


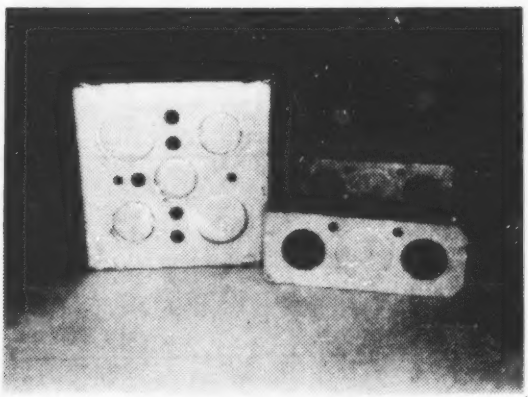


Instructional Objective II

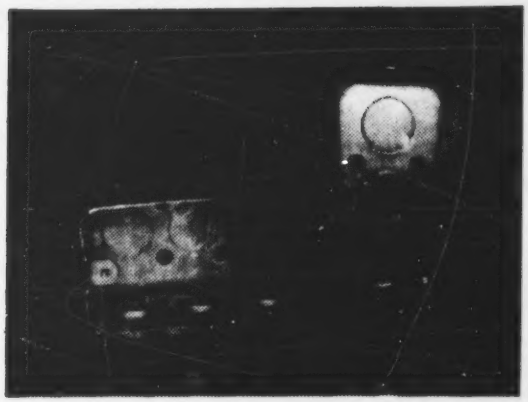
The student will identify the following 15 pieces of equipment used in this activity.

STEP 1 – Observe and study the following pieces of equipment:

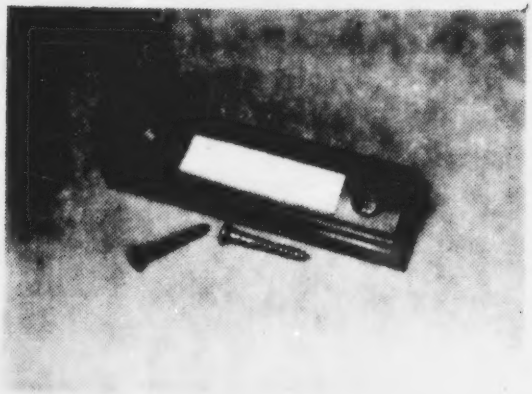
fuse box with switch



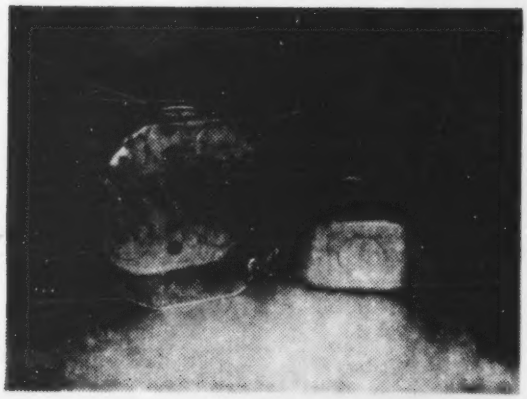
junction box, 4"(10.16 cm)



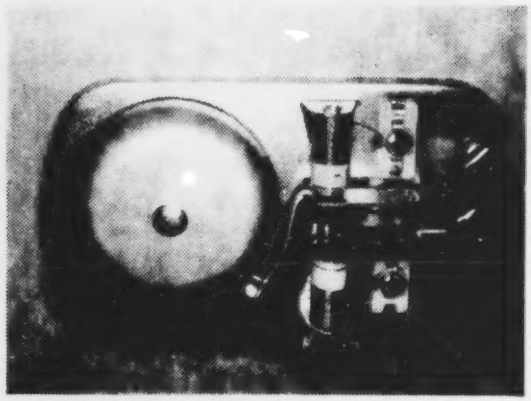
utility boxes



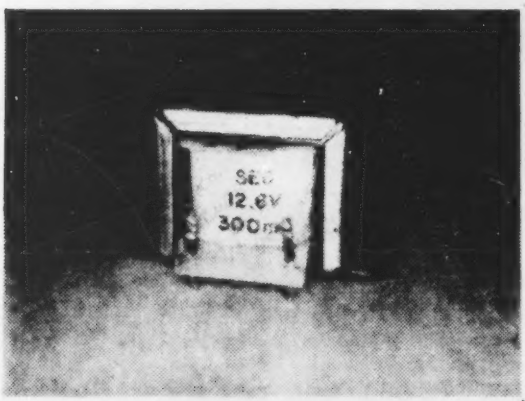
push button switch



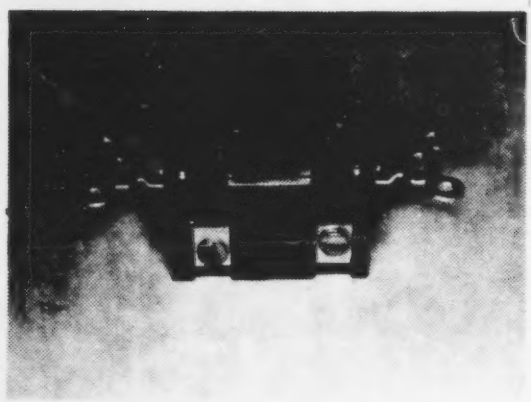
octagon boxes, 4 "(10.16 cm)



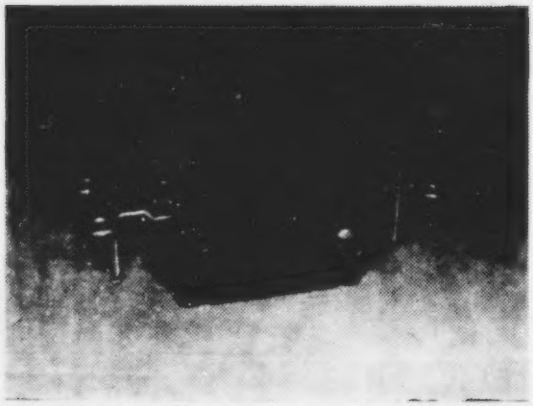
bell



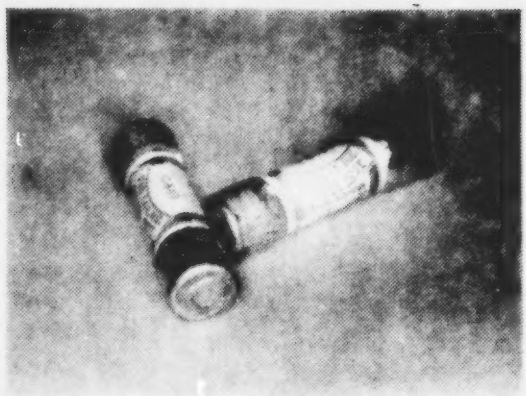
10 volt transformer



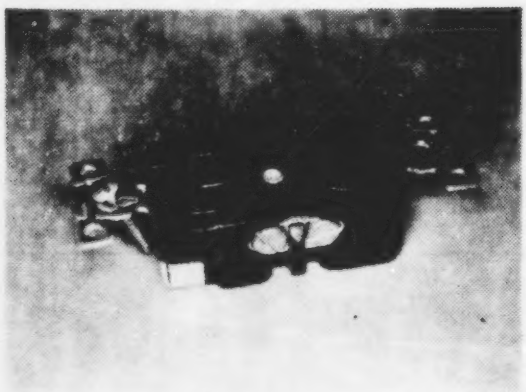
toggle switch



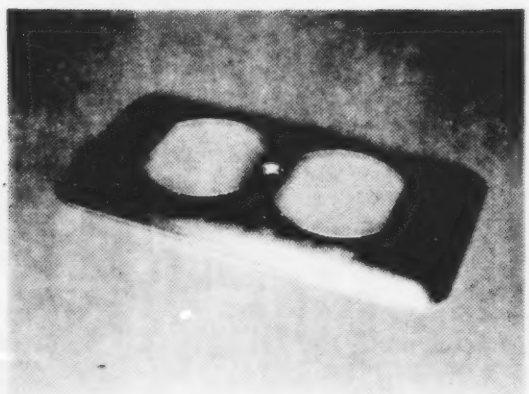
3 way toggle switch



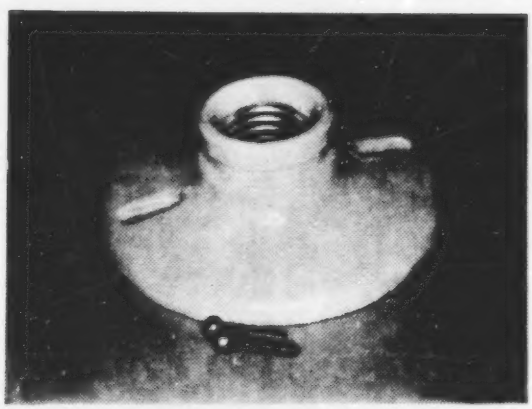
fuses



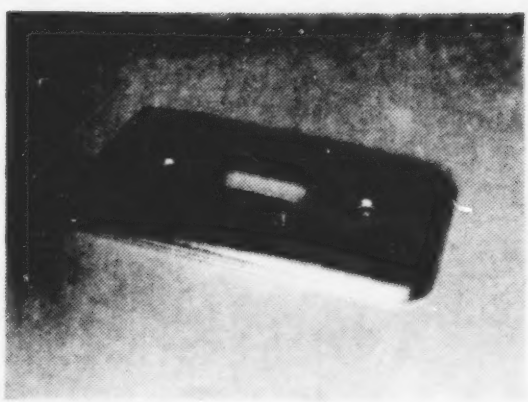
duplex receptacle



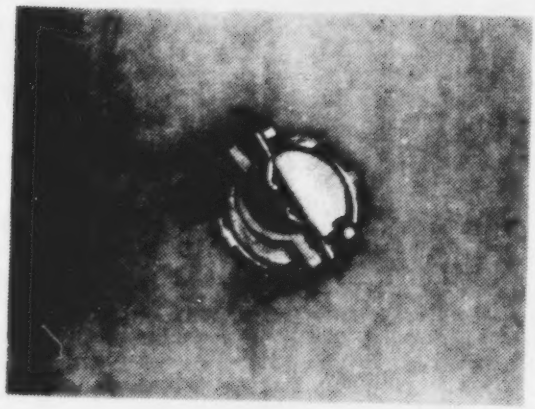
duplex receptacle plate



receptacle porcelain ceiling socket without switch



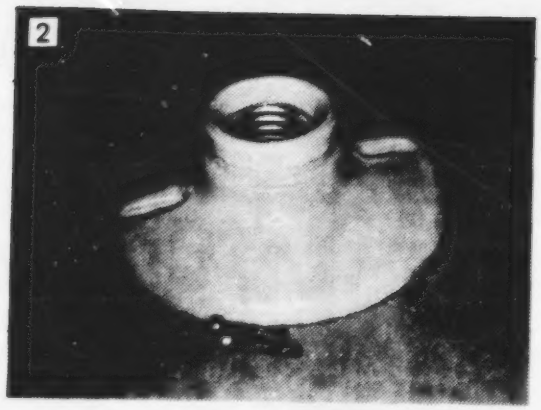
toggle switch plate

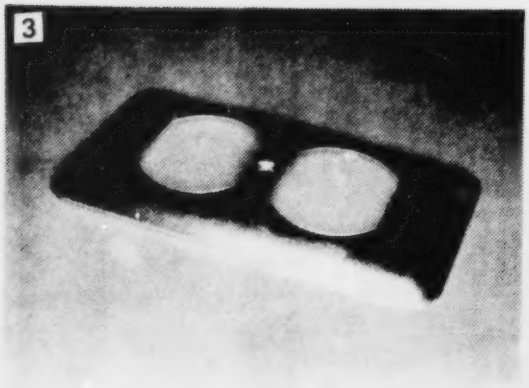


cable connectors

Check Point

On a separate sheet of paper, number 1 – 15 and identify the following pieces of equipment.

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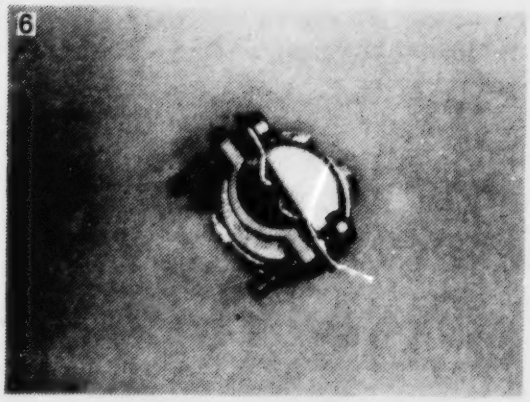
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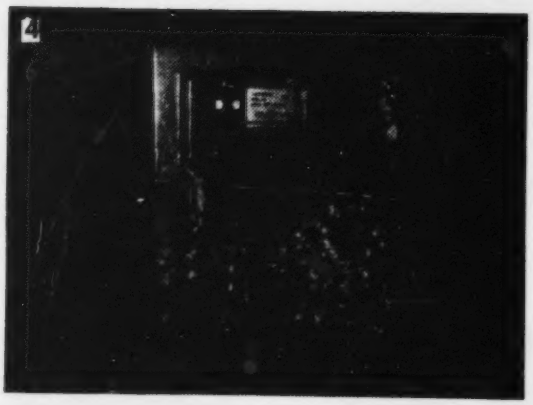
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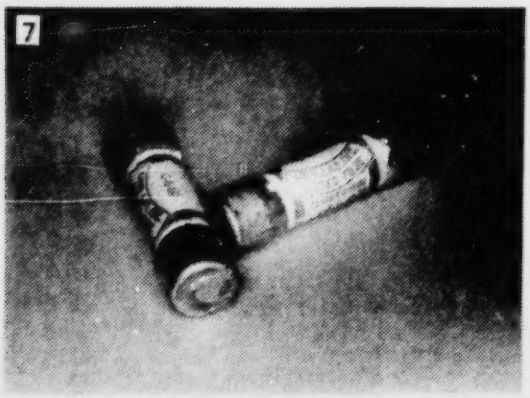
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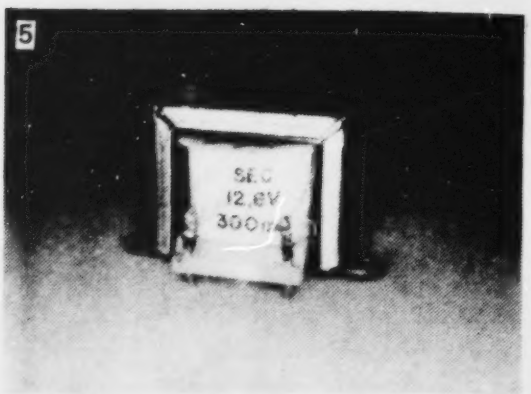
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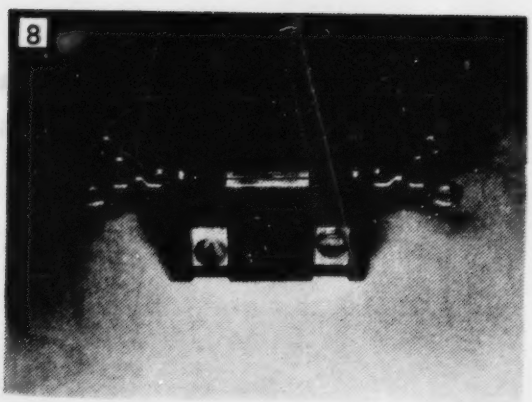
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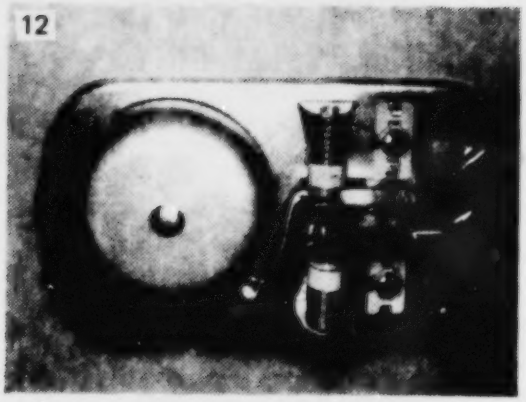
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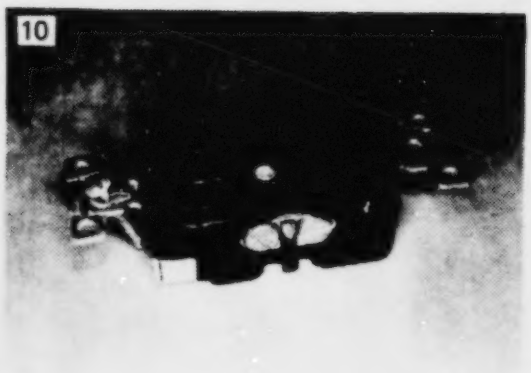
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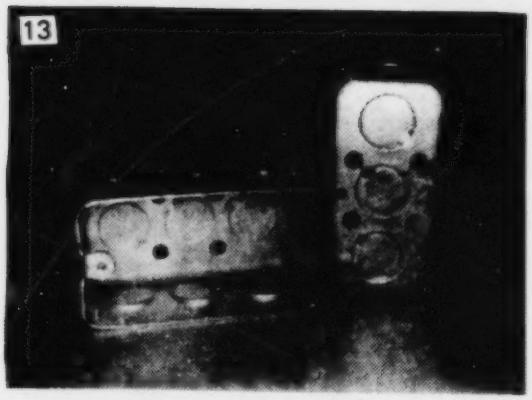
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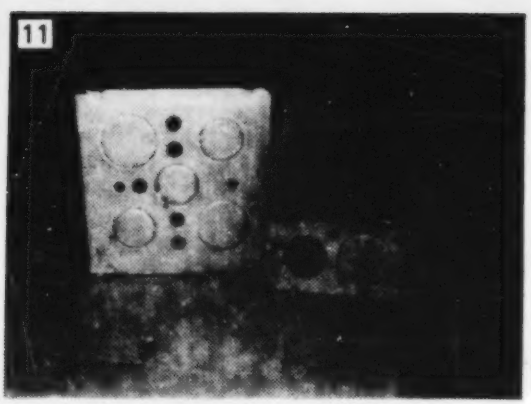
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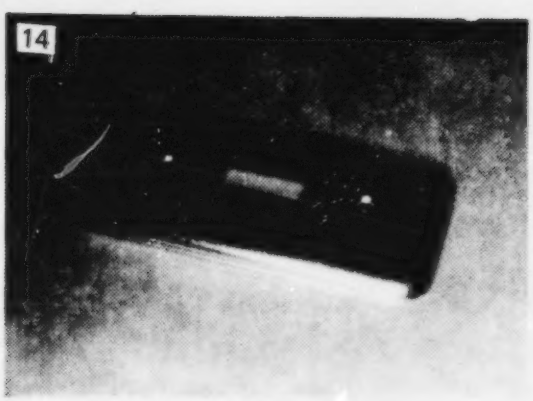
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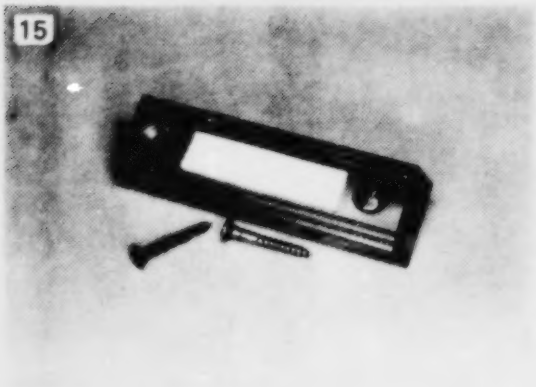
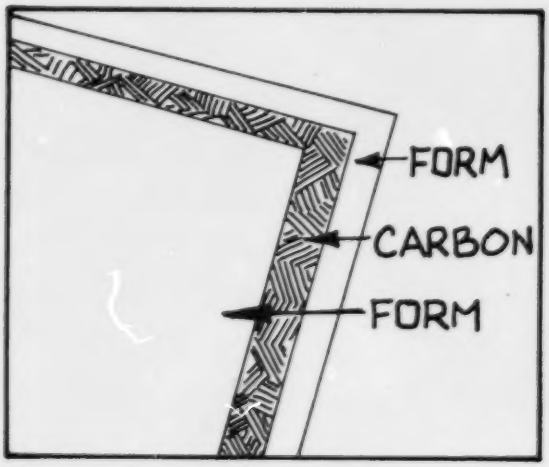


Instructional Objective 1

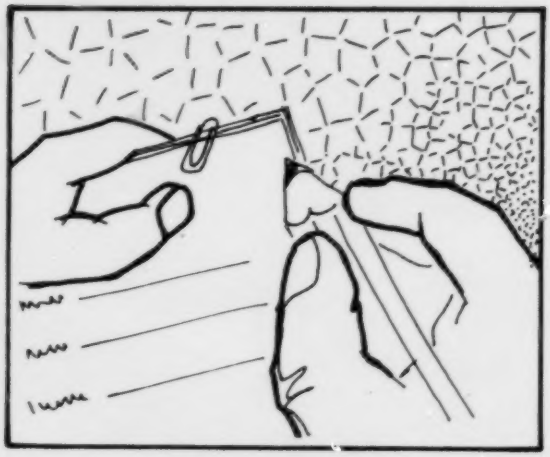
The salesperson will take materials order from the job supervisor.

STEP 1 – The student will obtain an order form and carbon paper from the instructor.



STEP 2 – The student will place the carbon paper between the sheets of the order form and prepare to take the order.

STEP 3 – The job supervisor will obtain materials list from the instructor.



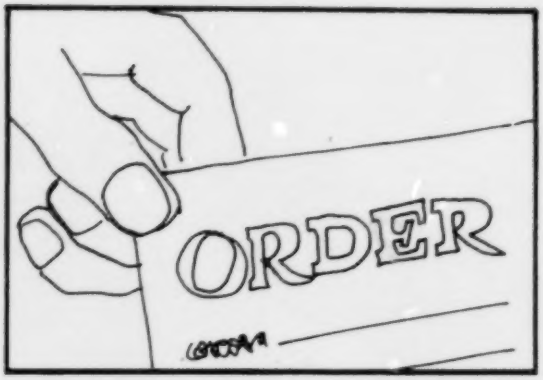
STEP 4 – The student will write the order given by the job supervisor on the order form.

Check Point

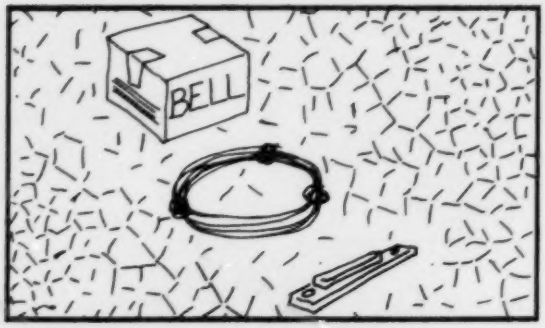
The salesperson will give one copy to the job supervisor and the other to the deliveryperson.

Instructional Objective II

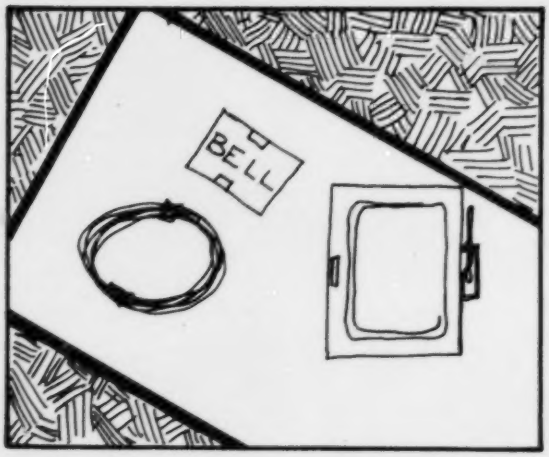
The deliveryperson will get the materials together to be delivered.



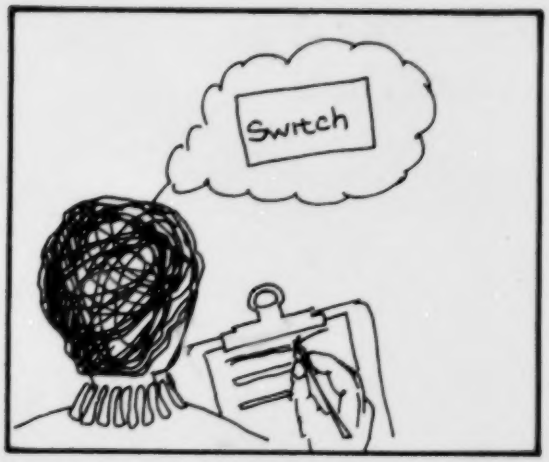
STEP 1 – The salesperson will show you the order.



STEP 2 – Get together the materials listed on the order form.



STEP 3 – Put materials in box to be delivered.



STEP 4 – Identify each piece of material and check it off the order form as you place it in the box.

Check Point

Have salesperson check over materials and order form.

Instructional Objective III

The deliveryperson will deliver the materials to his/her assigned group – A to C, B to D.

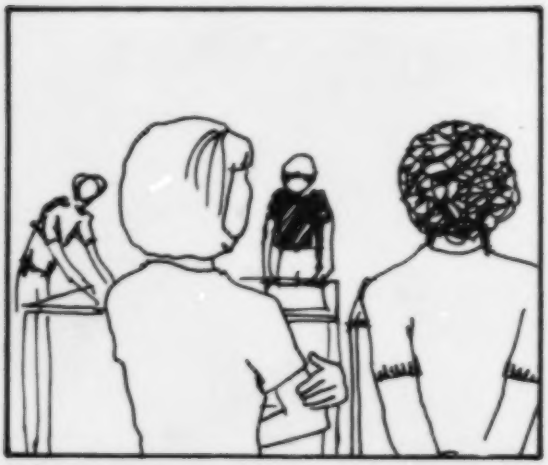
STEP 1 – The student will pick up the materials and carry them to his/her group.

Check Point

The deliveryperson will have the job supervisor sign order form and then will return the order form to the salesperson.

Instructional Objective IV

The inspectors (the salesperson and deliveryperson) watch their assigned groups build the project.



STEP 1 – Obtain check sheet from the instructor.

STEP 2 – Mark check sheet as the group completes each objective.

Check Point

Turn in completed check sheet to instructor.

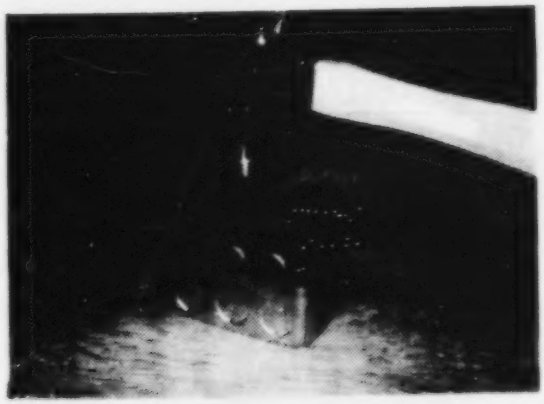
PROGRAMMED TEXT FOR GROUPS C AND D USING BOARD

The job supervisor will obtain tools from the instructor. The job supervisor will also give out material as needed. The job supervisor will assign jobs to the workers.

Instructional Objective I

The student will mount all the boxes and items to the board according to the drawing.

STEP 1 – The worker will place boxes on the board.



STEP 2 – The worker will use hammer and nail set to start hole for wood screw.

38

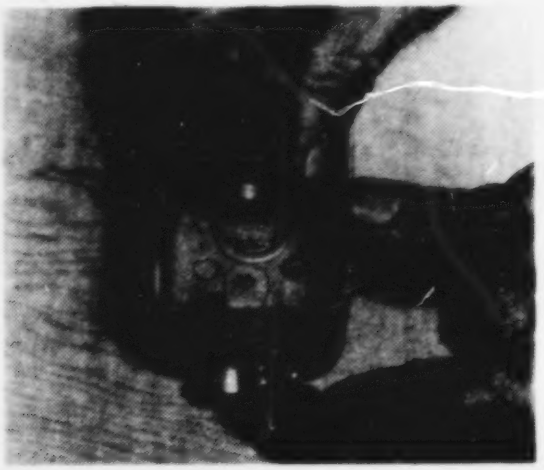
STEP 3 – The worker will put screw in hole and using screwdriver tighten screw. Two screws will be used in each box.

Check Point

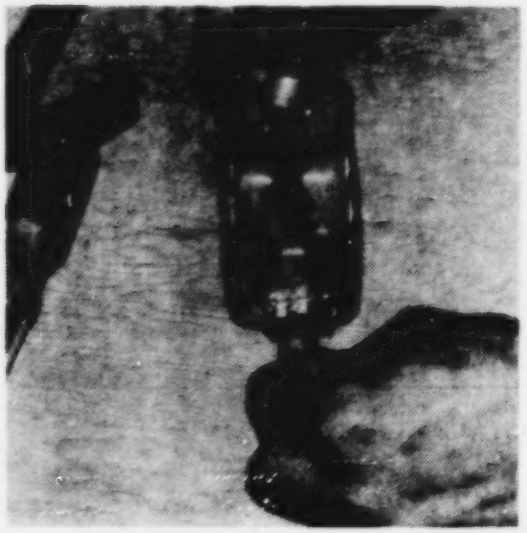
Have the inspector check your work and mark check sheet.

Instructional Objective II

The student will put the cable connectors and wire in utility and octagon boxes according to the diagram.
(See instructor's handout.)



STEP 1 – The worker will put the cable connectors on the boxes. Make sure the flat part of the lock nut is against the box and the screw heads are facing up.



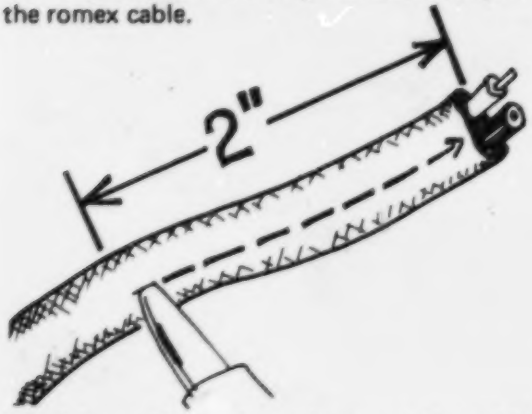
STEP 2 – The worker will put the romex cable in the boxes.

Check Point

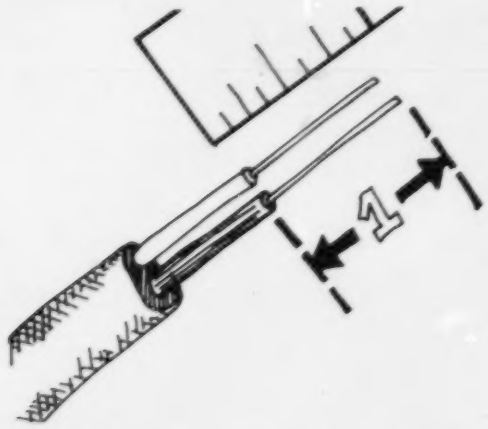
Have the inspector check your work and mark check sheet.

Instructional Objective III

The student will strip the insulation off the romex cable.



STEP 1 – Place wire strippers at the cable connector. Push through insulation and pull wire strippers toward you. When you reach the end of the cable pull out the wire and then cut the remainder of the outside insulation off at the cable connector.



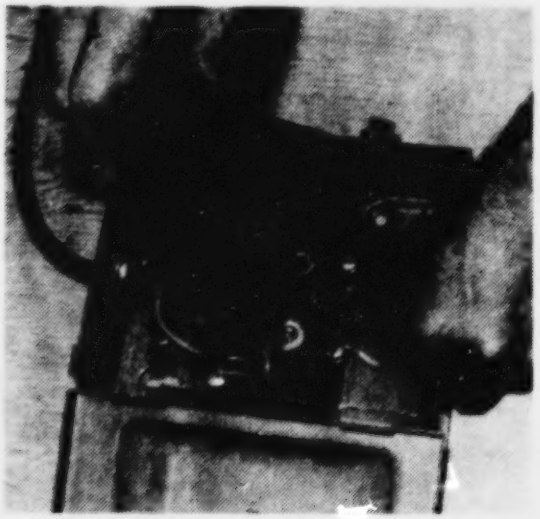
STEP 2 – Strip about one (1) inch (2.54 cm) insulation off the inside wires. Strip up one side with the wire strippers. Pull back insulation and cut where you started stripping the wire.

Check Point

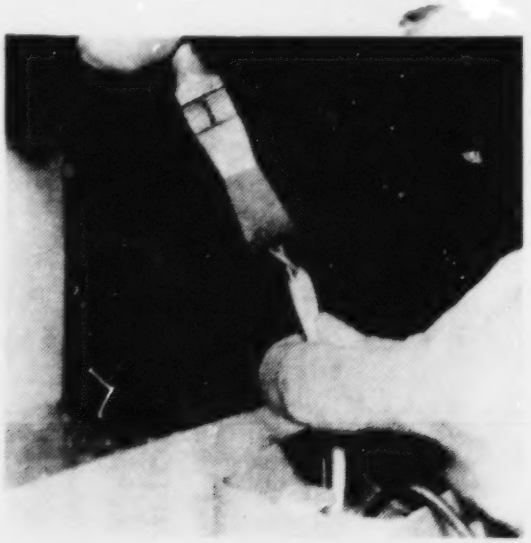
Have inspector check your work and mark check sheet.

Instructional Objective IV

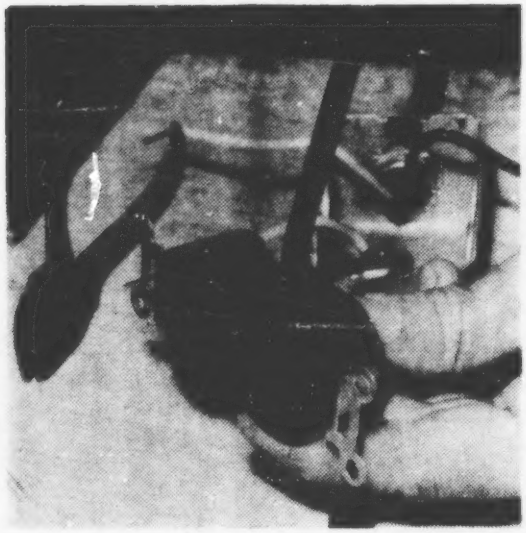
The student will wire the electrical hardware to the correct wires.



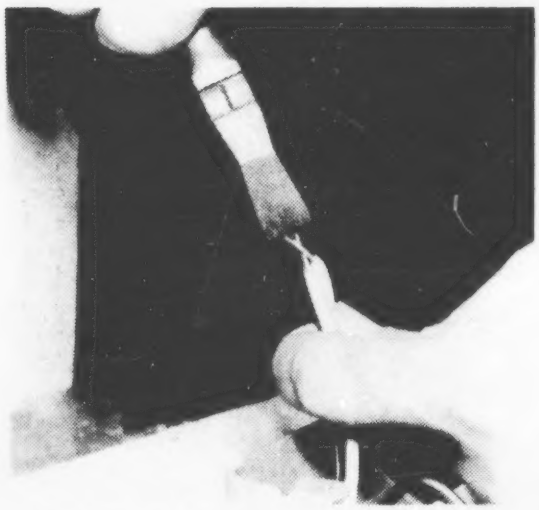
STEP 1 – Using the screwdriver, tighten the screws down in the fuse box after wires are placed under the correct screw (white in line with white, and black in line with black).



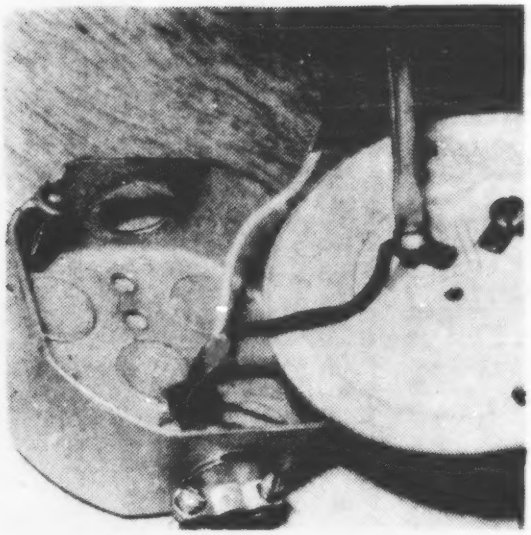
STEP 2 – In the junction box, you will need to twist all black wires together and tape them. After completing this, twist all the white wires together and tape them. When taping wires, make sure that no copper wire is showing.



STEP 3 – In the utility boxes where the duplex receptacles are, hook the white wires to the silver side and the black wires to the copper side. Use pliers to bend a hook on the wires. Use screwdriver to tighten screws after wires are placed under the screws.



STEP 4 – In the other utility boxes, twist the white wires together using the pliers and tape them. Make sure no copper wire is showing. Using the pliers, bend a hook on the remaining wires. Hook the wires according to the diagram (see instructor's handout). Use a screwdriver to tighten screw after wires have been placed under the screws.



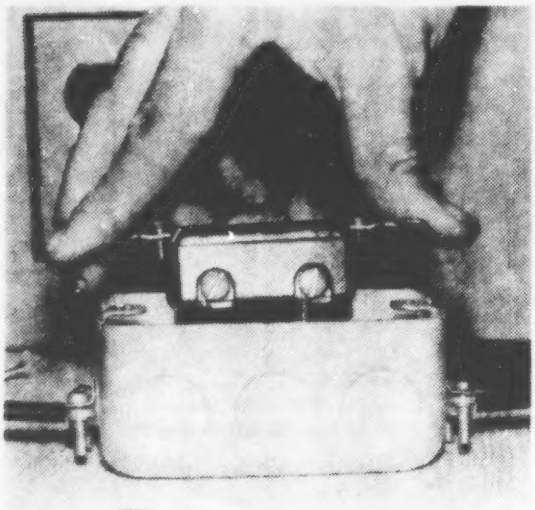
STEP 5 – In the octagon box, use pliers to bend a hook on both wires. Hook wires under the correct screws (white under silver, and black under copper) and tighten with screwdriver.

Check Point

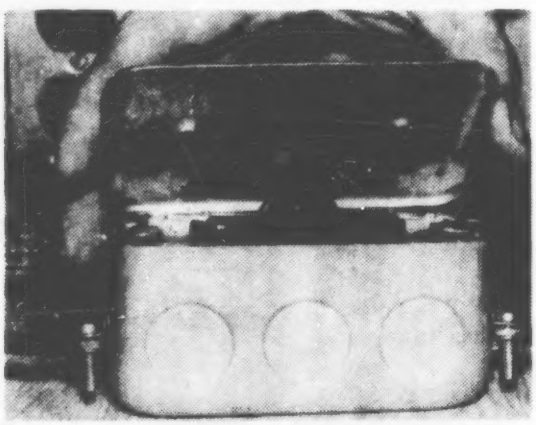
Have inspector check wiring and mark check sheet.

Instructional Objective V

The student will put the electrical hardware in boxes and put covers over them.



STEP 1 – Put electrical hardware in boxes and tighten screws with screwdriver.



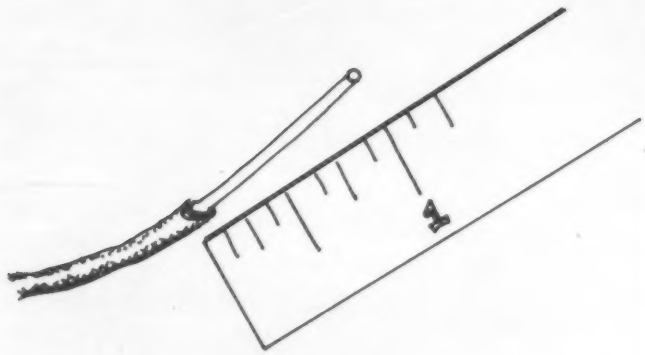
STEP 2 – Put cover on duplex receptacles and toggle switches and tighten using screwdriver.

Check Point

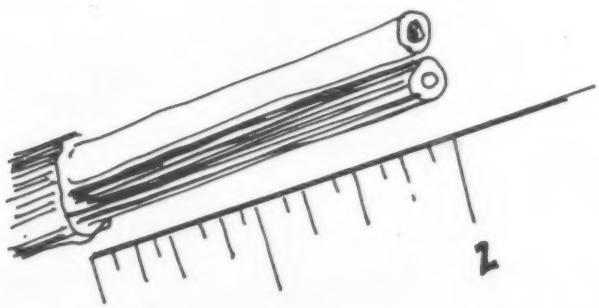
Have inspector check your work and mark check sheet.

Instructional Objective VI

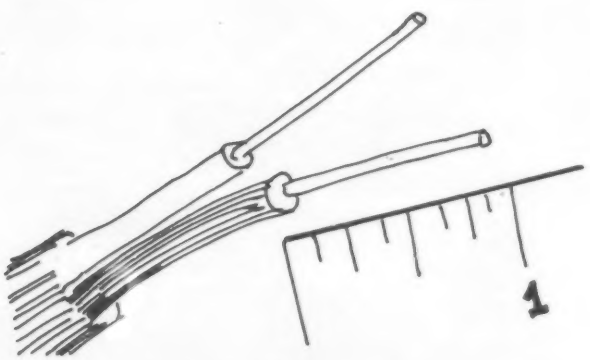
The student will wire the circuit containing the bell.



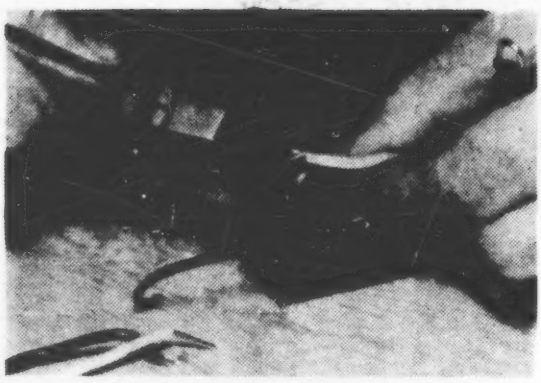
STEP 1 – Strip wire on the transformer about one (1) inch (2.54 cm), using wire strippers.



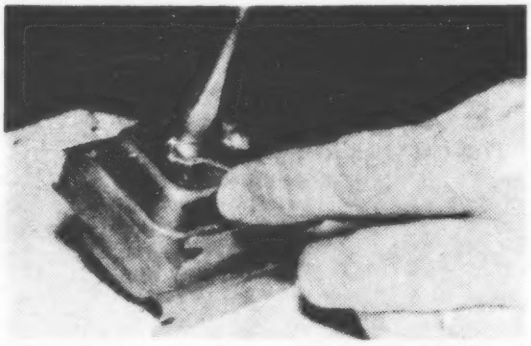
STEP 2 – Strip about two (2) inches (5.08 cm) of outside insulation off of romex cable.



STEP 3 – Strip one (1) inch (2.54 cm) of insulation off the two wires.

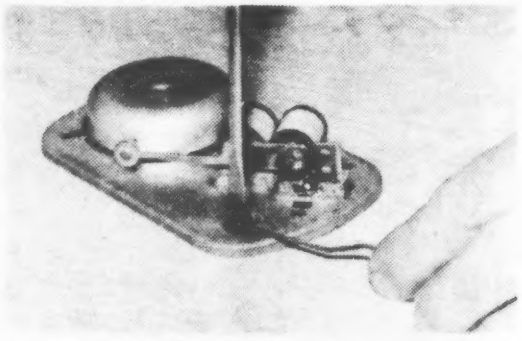


STEP 4 – Twist wires together (white to one wire and tape; black to the other and tape).



STEP 5 – Strip about one (1) inch (2.54 cm) off each end of the bell wire. Hook one end of one wire to the transformer after bending a hook on it. Hook the other end to the screw on the bell. Using a screwdriver, tighten screws.

STEP 6 – Hook one end of another wire to the transformer. Hook the other end to the push button switch.



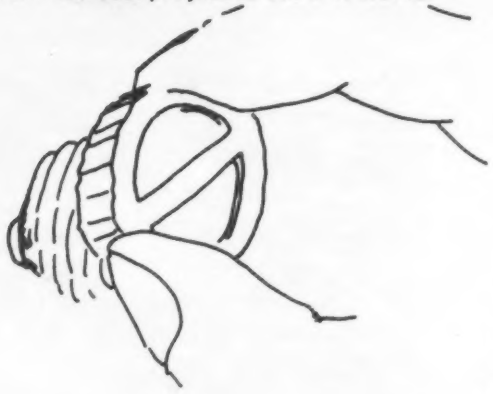
STEP 7 – Hook one end of another wire to the push button switch. Hook the other end to the bell.

Check Point

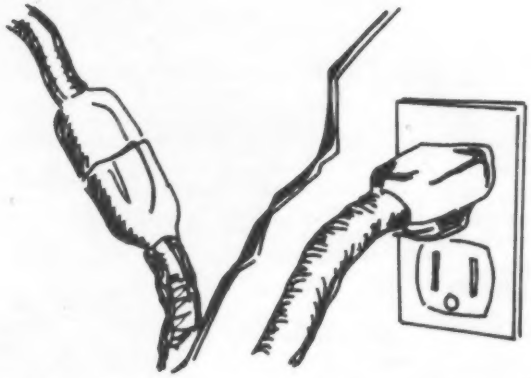
Have the inspector check your work and mark the check sheet.

Instructional Objective VII

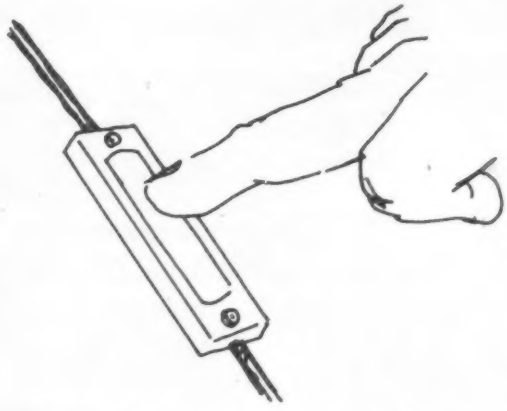
The student will put fuses in fuse box with switch and test project to see if it works.



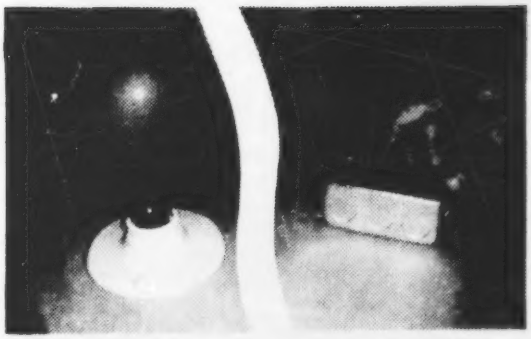
STEP 1 – Plug the plug on the fuse box into the drop cord. Make sure dropcord is plugged into a receptacle.



STEP 2 – Screw fuses into fuse box and turn on fuse box.



STEP 3 – Push the push button switch to make bell ring. If bell does not ring, check wiring.



STEP 4 – Turn on toggle switch to make light come on. If light does not burn, check light bulb and then check wiring.

STEP 5 – Turn on one toggle switch. If light comes on turn off with other toggle switch. If light goes out, turn on with first toggle switch. Light should come on again. If light does not burn, then you need to check wiring.

STEP 6 – Put continuity checker in duplex receptacle. Light should burn.

Check Point

Have inspector check work and mark check sheet.

Show the teacher that it works. After the teacher sees it working, you are ready to take it apart.

PROGRAMMED TEXT FOR GROUP C AND D USING WALL SECTION

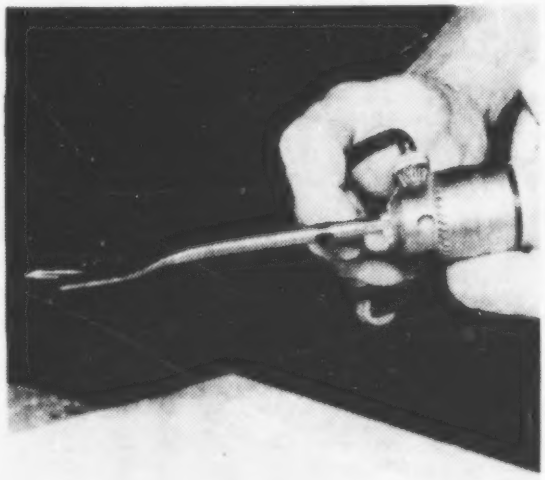
The job supervisor will obtain tools from the instructor. The job supervisor will give out materials as needed and will assign jobs to the workers.

Instructional Objective 1

The student will drill holes in the wall section according to the diagram.

SEE INSTRUCTOR'S HANDOUT

STEP 1 – Put bit into drill and tighten with chuck key.



STEP 2 – Drill holes through plywood according to diagram.

STEP 3 – Drill holes through 2 x 4 according to diagram. (See instructor's handout.)

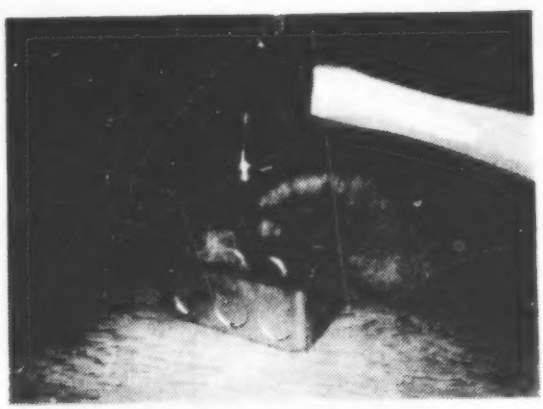
Check Point

Have inspector check your work and mark check sheet.

Instructional Objective II

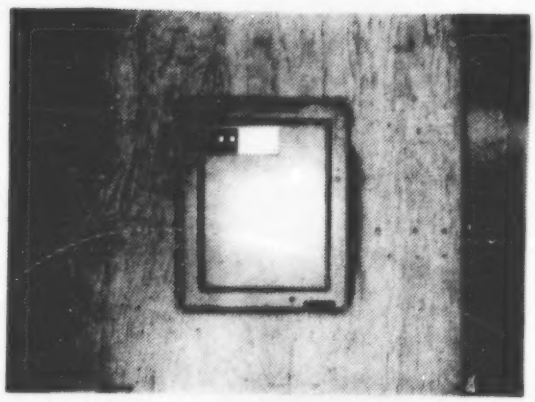
The student will mount boxes to the wall section according to the diagram. (See instructor's handout.)

STEP 1 – Put box(es) in place. Have someone hold the box while the worker mounts it to the board.



STEP 2 – The worker will use hammer and nailset to start hole for wood screw.

STEP 3 – The worker will put screw in hole and using screwdriver tighten screw. Put two screws in each box.



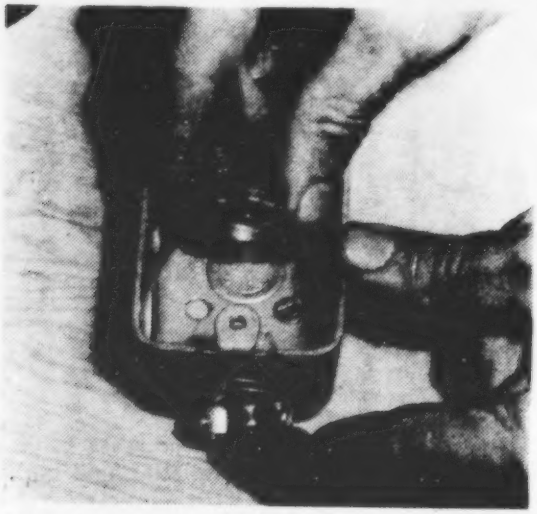
STEP 4 – Put fuse box with switch on outside of wall section.

Check Point

Have inspector check your work and mark check sheet.

Instructional Objective III

The student will put the cable connectors and wire in the boxes according to the diagram. (See instructor's handout.)



STEP 1 – The worker will put the cable connectors on the boxes. Make sure the flat part of the lock nut is against the box and the screw heads are facing up.

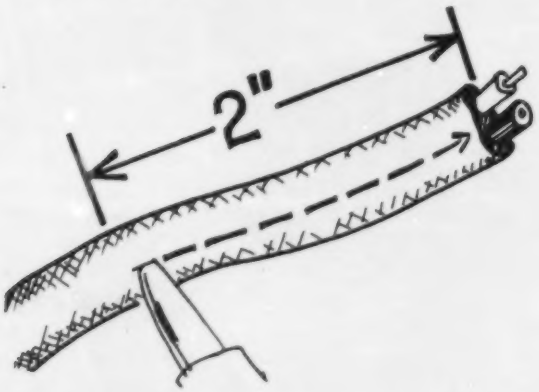
STEP 2 – The worker will put the romex cable in the box(es) according to the diagram. Make sure the end of the wire reaches the other side of the box.

Check Point

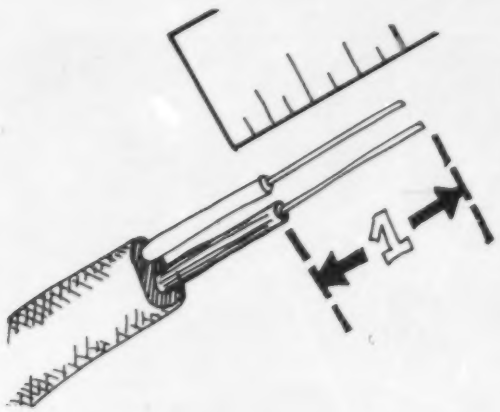
Have the inspector check your work and mark check sheet.

Instructional Objective IV

The student will strip the insulation off the romex cable.



STEP 1 – Place the wire stripper at the cable connector. Push through insulation and pull wire stripper toward you. When you reach the end of the cable, pull out the wire and cut the remainder of the outside insulation off at the cable connector.



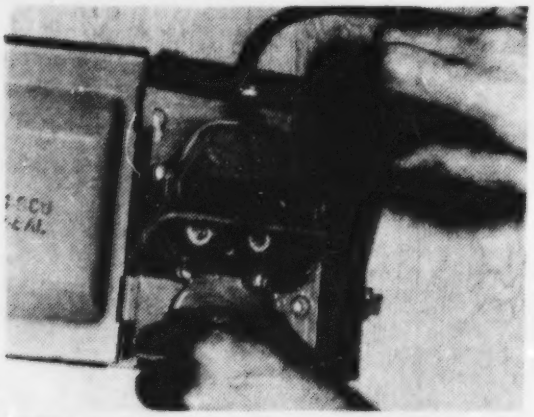
STEP 2 – Strip about one (1) inch (2.54 cm) insulation off the inside wires. Strip up one side with the wire stripper. Pull back insulation and cut where you started stripping.

Check Point

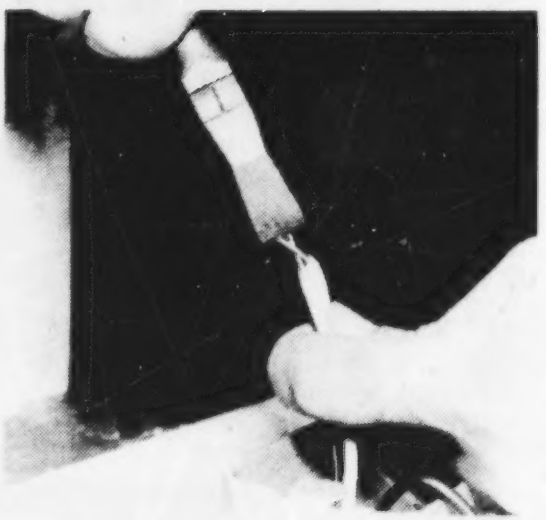
Have inspector check your work and mark check sheet.

Instructional Objective V

The student will wire the electrical hardware to the correct wires.



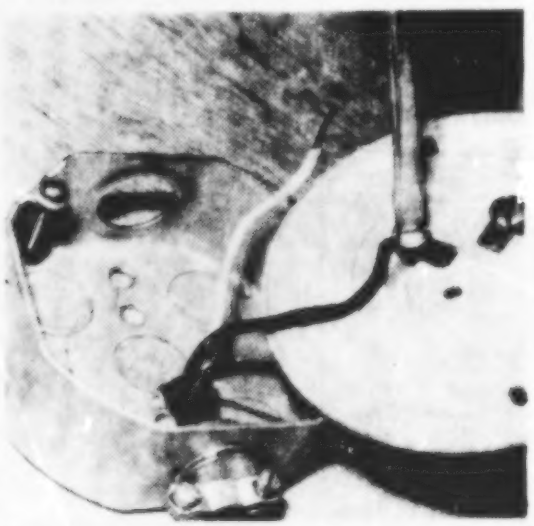
STEP 1 – Using the screwdriver, tighten the screw down in the fuse box after wires are placed under the correct screw (white in line with white, and black in line with black).



STEP 2 – In the junction box, you will need to twist all black wires together and tape them. After completing this, twist all the white wires together and tape them. When taping wires, make sure that no copper wire is showing.

STEP 3 – In the utility boxes where the duplex receptacles are, hook the white wires to the silver side and the black wires to the copper side. Use the pliers to bend a hook on the wires. Use the screwdriver to tighten screws after wires are placed under the screws.

STEP 4 – In the other utility boxes, twist the white wires together using the pliers and tape the wires. Make sure no copper wire is showing. Using the pliers, bend a hook on the remaining wires. Hook the wires according to the diagram (see instructor's handout). Use a screwdriver to tighten screw after wires have been placed under the screws.



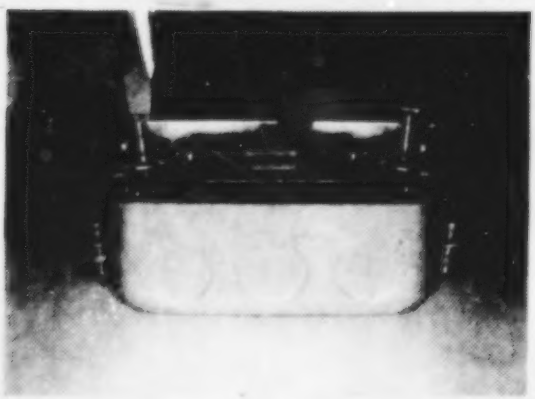
STEP 5 – In the octagon box, use pliers to bend hook on both wires. Hook wires under the correct screws (white to silver, and black to copper) and tighten with screwdriver.

Check Point

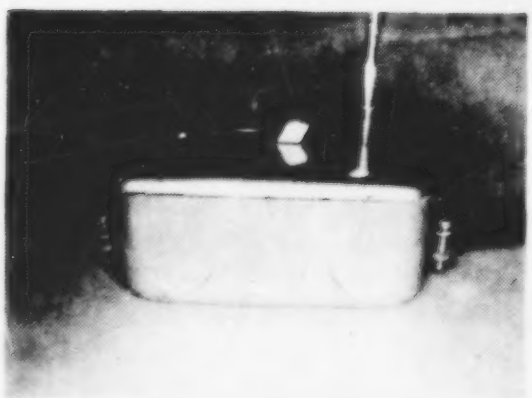
Have inspector check wiring and mark check sheet.

Instructional Objective VI

The student will put the electrical hardware in boxes and put covers over them.



STEP 1 – Put electrical hardware in boxes and tighten screws with screwdriver.



STEP 2 – Put cover on duplex receptacles and toggle switches and tighten using screwdriver.

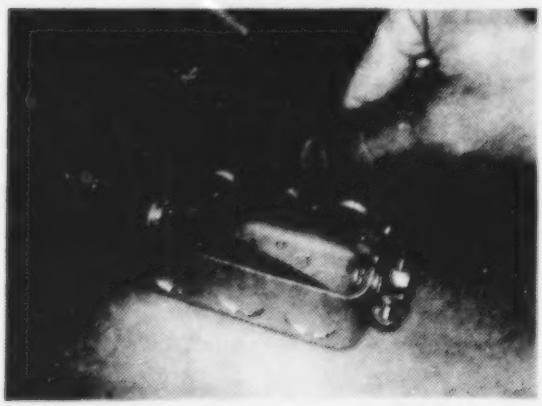
Check Point

Have inspector check your work and mark check sheet.

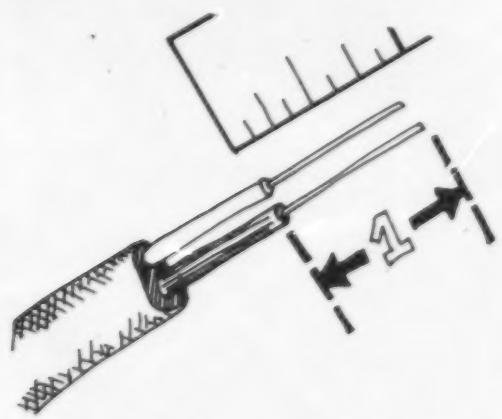
Instructional Objective VII

The student will wire the circuit containing the bell.

STEP 1 – Strip wire on transformer about one (1) inch (2.54 cm) using wire strippers.

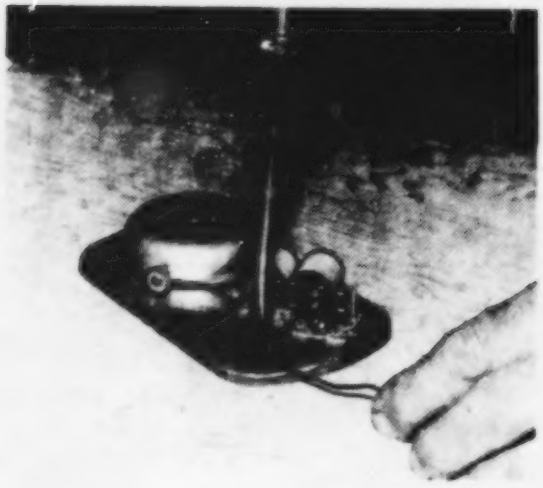


STEP 2 – Strip about two (2) inches (5.08 cm) of outside insulation off the romex cable.

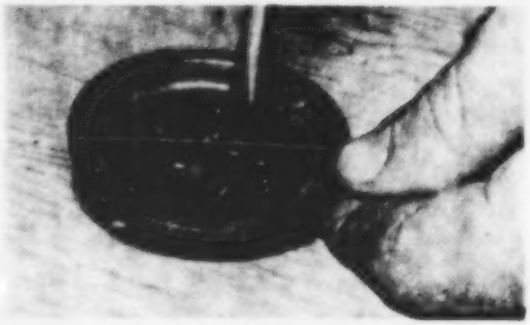


STEP 3 – Strip one (1) inch (2.54 cm) of insulation off the two wires.

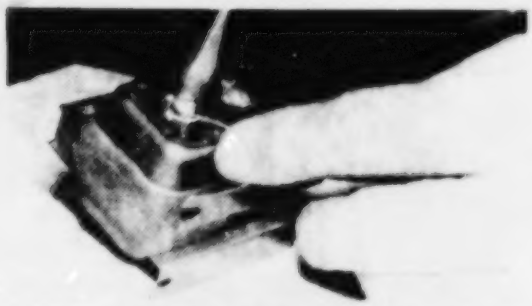
STEP 4 – Twist wires together (white to one wire and tape; black to the other and tape).



STEP 5 – Mount transformer and bell to wall using hammer, nail set and screwdriver. Strip about one (1) inch (2.54 cm) off each end of the bell wire. Hook one end of one wire to the transformer after bending a hook on it. Hook the other end to the bell.



STEP 6 – Hook one end of another wire to the transformer. Hook the other end to the push button switch.



STEP 7 – Hook one end of another wire to the push button switch. Hook the other end to the bell.

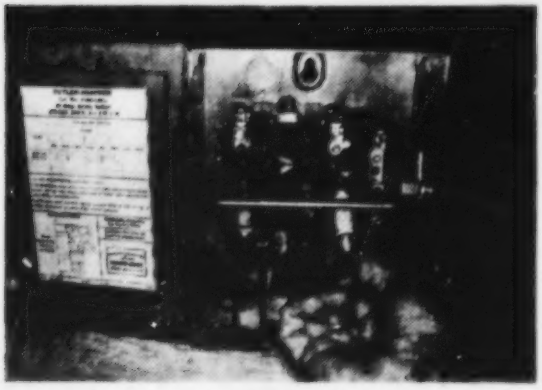
Check Point

Have the inspector check your work and mark the check sheet.

Instructional Objective VIII

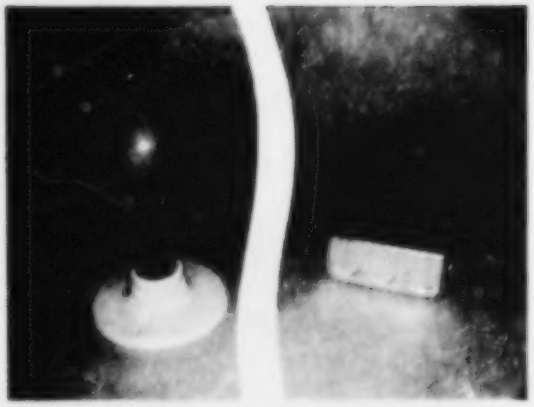
The student will put fuses in fuse box and test project.

STEP 1 – Plug the plug on the fuse box into the dropcord. Make sure dropcord is plugged into a receptacle.

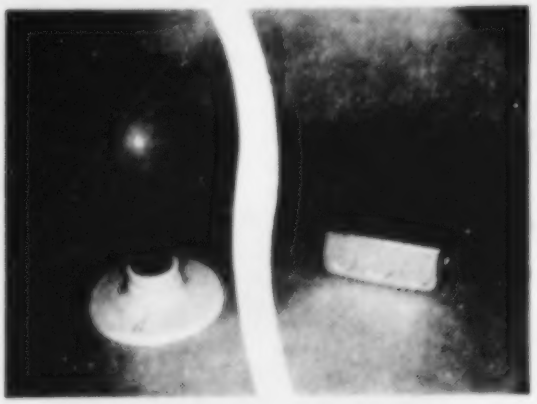


STEP 2 – Screw fuses into fuse box and turn on fuse box.

STEP 3 – Push the pushbutton switch to make the bell ring. If bell does not ring, check wiring.



STEP 4 – Turn on toggle switch to make light come on. If light does not burn, check lightbulb, then check wiring.



STEP 5 – Turn on one toggle switch. If light comes on, turn off with other toggle switch. If light goes out, turn on with first toggle switch. If light does not burn, you need to check wiring.

STEP 6 – Put continuity checker in duplex receptacle. Light should burn.

Check Point

Have inspector check work and mark check sheet.
Show the teacher that it works. After the teacher sees it working, you are ready to take it apart.

824.261-010 ELECTRICIAN (any ind.) wirer.

Plans layout, installs, and repairs wiring, electrical fixtures, apparatus, and control equipment: Plans new or modified installations to minimize waste of materials, provide access for future maintenance, and avoid unsightly, hazardous, and unreliable wiring, consistent with specifications and local electrical codes. Prepares sketches showing location of wiring and equipment, or follows diagrams or blueprints, insuring that concealed wiring is installed before completion of future walls, ceilings, and flooring. Measures, cuts, bends, threads, assembles, and installs electrical conduit, using such tools as hacksaw, pipe threader, and conduit bender. Pulls wiring through conduit, assisted by ELECTRICIAN HELPER (any ind.). Splices wires by stripping insulation from terminal leads with knife or pliers, twisting or soldering wires together, and applying tape or terminal caps. Connects wiring to lighting fixtures and power equipment, using handtools. Installs control and distribution apparatus, such as switches, relays, and circuit-breaker panels, fastening in place with screws or bolts, using handtools and power tools. Connects power cables to equipment, such as electric range or motor, and installs grounding leads. Tests continuity of circuit to insure electrical compatibility and safety of components, using testing instruments, such as ohmmeter, battery and buzzer, and oscilloscope. Observes functioning of installed equipment or system to detect hazards and need for adjustments, relocation, or replacement. May repair faulty equipment or systems [ELECTRICAL REPAIRER (any ind.)]. May be required to hold license. May cut and weld steel structural members, using flamecutting and welding equipment. May be designated according to work location as MINE ELECTRICIAN (mining & quarrying).